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**(54) METHOD FOR MANUFACTURING NEW MICRO PATTERN
POLARIZING ELEMENT AND THREE DIMENSIONAL LIQUID CRYSTAL
DISPLAY DEVICE USING THE SAME**

(57)Abstract:

PROBLEM TO BE SOLVED: To establish a method for manufacturing a micro pattern polarizing element having excellent partial orientation of a dichroic dye compound without necessitating extremely high positioning precision such as panel alignment.

SOLUTION: The method for manufacturing the polarizing element consists of steps of: forming a liquid crystalline polymer thin film with an optically active group on a substrate; irradiating the thin film with linearly polarized light; then irradiating the thin film with linearly polarized light with a different axis of polarization via a different mask with a micro pattern; and aligning the dichroic molecules on the thin film in a micro pattern. The dichroic molecule solution is applied with a printing machine with low printing pressure such as a roll coater, a flexographic machine, a screen printing machine, etc., so as to apply 0.05 to 1.0 Mpa pressure in a direction vertical to the substrate.

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CLAIMS

[Claim(s)]

[Claim 1] Form on a substrate the liquid crystallinity macromolecule thin film which has an optical active group, and the linearly polarized light is irradiated at this thin film. Subsequently, after irradiating the linearly polarized light which has a different polarization shaft through the mask of the shape of another micro pattern, it sets at the process which makes a dichroism molecule arrange in the shape of a micro pattern on this thin film. a substrate -- receiving -- a perpendicular direction -- the pressure of 0.01MPa-1.0MPa -- ** or ** -- the manufacture approach [claim 2] of the polarizing element which applies a dichroism molecule solution like The manufacture approach of a polarizing element according to claim 1 that a dichroism molecule solution is a solution containing an anion system surfactant [claim 3] The manufacture approach of the polarizing element according to claim 2 which is one sort chosen from the group which

the anion system surface active agent in claim 2 becomes from polyoxyethylene lauryl etheral sulfate sodium, a polyoxyethylene-alkyl-ether sodium sulfate, polyoxyethylene-alkyl-ether sulfuric-acid triethanolamine, a polyoxyethylene-alkyl-phenyl-ether sodium sulfate, sodium lauryl sulfate, a lauryl ammonium sulfate, and lauryl sulfuric-acid triethanolamine, or two sorts or more [claim 4] The manufacture approach of the polarizing element of claim 1 whose optical active group in claim 1 thru/or claim 3 is one sort chosen from the group which consists of N=N of non-aromaticity, C=C of non-aromaticity, and C=N of non-aromaticity, or two sorts or more thru/or claim 3 [claim 5] The manufacture approach of the polarizing element of claim 1 whose liquid crystallinity macromolecule thin film in claim 1 thru/or claim 3 is a polyamide, polyimide, polyester, or a polyurethane resin thin film thru/or claim 3 [claim 6] The manufacture approach of the polarizing element of claim 1 whose liquid crystallinity giant-molecule thin film in claim 1 thru/or claim 3 is a Pori cinnamic acid vinyl resin thin film thru/or claim 3 [claim 7] The manufacture approach of the polarizing element of claim 1 whose dichroism molecule in claim 1 thru/or claim 3 is coloring matter which has lyotropic liquid crystal nature thru/or claim 3 [claim 8] The manufacture approach of the polarizing element of claim 7 that the coloring matter which has the lyotropic liquid crystal nature of claim 7 is coloring matter which has a hydrophilic substituent [claim 9] The manufacture approach of the polarizing element of claim 8 which are one or more radicals chosen from the group which a hydrophilic substituent becomes from a sulfonic group, a carboxylic-acid radical, the amino group, and a hydroxyl group in claim 8 [claim 10] The manufacture approach of the polarizing element of claim 1 to which the exposure of the linearly polarized light in claim 1 thru/or claim 3 is performed using the laser beam which has polarizability thru/or claim 3 [claim 11] Three dimensional display equipment which is a liquid crystal display which has the vertical substrate which counters, and is the substrate with which at least one side of this substrate has the polarizing element of a publication in any 1 term of claim 1 thru/or claim 10

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the manufacture approach of a new rate of high polarization micro pattern polarizing element, and its application. Furthermore, it is related with the three dimensional display equipment which makes possible stereoscopic vision using the micro pattern polarizing element and it from which a polarization shaft differs.

[0002]

[Description of the Prior Art] Some polarizing elements which carried out pattern formation of two or more polarization fields where polarization transparency shaft orientations differ from the former are known. For example, on the polyvinyl alcohol film extended to JP,62-96905,A, it after [spreading]-pattern-exposes, a resist is developed, patterning of the resist is carried out, and the approach of dyeing the extension polyvinyl alcohol film part which is not covered by the resist with a dichroism compound, and forming the polarization field of a request pattern is proposed. Sadeg M.Faris is 1991. Society of Information and Display Conference The resist was applied on the dichroism polyvinyl alcohol film set and extended, the polarization film which carried out dissolution removal and which was patternized in the caustic-alkali-of-sodium water solution after patterning was obtained, and the approach of piling up the patternizing polarization film of two sheets with which a polarization shaft intersects perpendicularly, producing a polarizing element called muPol, and using for stereoscopic vision has been announced (SID 91 DIGESTp 840-843). Polarization is irradiated in the shape of a pattern at the optical orientation matter thin film applied to JP,7-261024,A on the substrate, and the approach of making carry out spreading orientation of the dichroism coloring matter solution, and forming the polarization field of a desired pattern on it, is proposed. A substrate is covered with the orientation film of a fluororesin to JP,9-73015,A, a resist is applied on it and the micro patternizing polarizing element which carries out the laminating of the ingredient containing the dichroism coloring matter after patterning, and forms it is proposed. The polarizing element which the polarization transparency shaft of what adjoin JP,10-160932,A in two or more pieces of polarization is changed, and sticks it on a base material is proposed. The partially polarized light member of the shape of the strip of paper which shaved partially the polarization film arranged on a base material in the dicer to JP,10-160933,A, and turned the polarization transparency shaft in the one direction, or a grid is formed. The polarizing element which arranges a polarization film in the direction in which polarization shafts besides differ, already shaves off the polarization film part of the part on a certain polarization member in a dicer, and has two or more polarization transparency shafts, Or the polarizing element which stuck that from which the polarization transparency shaft of a partially polarized light member shaved by the dicer differs is proposed.

[0003] The 2 eye type stereoscopic vision which various approaches are proposed about the stereoscopic vision of an image on the other hand, and uses polarization is one of them. The image the object for right eyes over which is also called a polarization glasses method and the glasses which used the polarizing plate with which a right eye, a left eye, and a polarization shaft cross at right angles respectively are covered and which has binocular parallax, and for left eyes is a method which the plane of polarization of light is made to intersect perpendicularly respectively, distributes image information on either side to an eye on either side respectively with the polarizing plate of an observer's glasses, and is observed. In order to project the image with which the polarization directions differ in this method, the approach of compounding the image made using two sets of displays and projection equipments by the half mirror or the polarization mirror is taken. In this case, although it was suitable when a display became expensive and a solid image was shown to many spectators, it had the trouble of not being fit for the other displays for office seen by home use or a small number of people. Then, if the micro

pattern polarizing element to which a polarization shaft intersects perpendicularly in the same field is used for a display, it is proposed that it is possible to display the image for right eyes and the image for left eyes on coincidence, and the price of equipment can also be made cheap into one set of a display.

[0004]

[Problem(s) to be Solved by the Invention] There are the following troubles in the polarizing element which carried out pattern formation of two or more polarization fields where the polarization transparency shaft orientations known from the former differ. In order to dye the extended PVA film by the approach of JP,62-96905,A, in case polarization ability not only becomes low, but development patterning of the resist is carried out rather than the approach of extending after the usual dyeing, an extension PVA film swells, optically uniaxial is spoiled, polarization ability falls further, and there is a problem that the polarizing element of the rate of polarization satisfactory as a result is not obtained.

[0005] Sadeg M.Faris is Society of Infomation and Display Conferance. By the approach (SID 91 DIGEST p 840-843, USP5327285) set and announced A resist is applied on the extended dichroism polyvinyl alcohol film. In order to stick two kinds of substrates with which polarization ability's falling since the polarizing element part left behind in case dissolution removal is carried out in the caustic-alkali-of-sodium water solution after patterning swells, and a polarization shaft intersect perpendicularly and to manufacture them, there is a problem that very high positioning accuracy is required in the case of pasting.

[0006] Although polarization is irradiated in the shape of a pattern at the thin film of the optical orientation matter applied on the substrate and spreading orientation of the dichroism coloring matter solution is carried out on it by the approach of JP,7-261024,A, in relation to this, Ichimura is doing the following reports in Mol.Cryst.Liq.Cryst., 1997, Vol.298, and pp 221-226. The part in which coloring matter carried out orientation to homogeneity when this coloring matter film that carried out orientation was observed with the atomic force microscope (AFM), and the part (crater) which coloring matter hardly exists and moreover has not carried out orientation are observed. It turned out that the absorbance of the part which the part and coloring matter which carried out orientation hardly exist in homogeneity, and moreover has not carried out orientation to it is measured with a microspectrophotometer, the homogeneity of the whole coloring matter film falls since there are many these craters, and coloring matter has become what has inadequate polarization ability. When this invention person etc. calculated the dichroism ratio (DR) from the absorbance of the part which is carrying out orientation, and the part which has not carried out orientation, it was not the level for which there are $DR(a) \gg 30$, and $DR(b) \approx 1.3$ and a big difference, and depends including these, and is set to $DR=5-6$ and it can be satisfied with a large area of level as an object for display devices. In addition, count of a dichroism ratio (DR) is based on a degree.

$DR=A//A^{**}A||$: An absorbance when a polarization shaft is parallel to the molecule major axis of orientation coloring matter.

A^{**} : An absorbance when a polarization shaft is perpendicular to the molecule major axis of orientation coloring matter.

[0007] Although a substrate is covered with the fluoro-resin orientation film, a resist is applied on it, the laminating of the ingredient containing the dichroism coloring matter

after patterning is carried out and the micro patternizing polarizing element is formed by the approach of JP,9-73015,A After development on a front face in the effect of the resist film which remains thinly [when the fluororesin orientation film is processed by the resist] Or since the stacking tendency of the fluororesin orientation film is reduced under the effect of a development There is a problem that the stacking tendency of the dichroism coloring matter ingredient by which a laminating is carried out to ***** is not enough, and polarization ability is inadequate.

[0008] Although the polarization transparency shaft of those which adjoin two or more pieces of polarization is changed, it sticks on a base material and the polarizing element is formed by the approach of JP,10-160932,A, there is a problem that very high positioning accuracy is required in the case of pasting of two or more pieces of polarization. By the approach of JP,10-160933,A The partially polarized light member of the shape of the strip of paper which shaved partially the polarization film arranged on a base material in the dicer, and turned the polarization transparency shaft in the one direction, or a grid is formed. Although the polarizing element which arranges a polarization film, already shaves off the polarization film part of the part on a certain polarization member in a dicer, and has two or more polarization transparency shafts, or the thing from which the polarization transparency shaft of a partially polarized light member shaved by the dicer differs is stuck in the direction in which polarization shafts besides differ and the polarizing element is formed in it In case it is the lamination of two or more partially polarized light members from which a very high precision was required of the process deleted in a dicer, or the polarization transparency shaft differed, there is a problem that very high positioning accuracy is required.

[0009] From this viewpoint, this invention person etc. did not need very high positioning accuracy like lamination, but inquired wholeheartedly for the purpose of offering the manufacture approach of a micro pattern polarizing element that the partial orientation of a dichroism coloring matter compound is excellent, and resulted in this invention. This invention relates to the approach of manufacturing the polarizing element which reduces generating of a part (crater) which coloring matter hardly exists and moreover has not carried out orientation as much as possible, raises the orientation of a dichroism compound on the whole, and is in a practical use level as an object for display devices, in the approach indicated by JP,7-261024,A.

[0010]

[Means for Solving the Problem] this invention person etc. examined wholeheartedly the method of application of the optical activated-molecule layer and dichroism molecule solution which fitted further the micro pattern-like different direction-array of a dichroism coloring matter molecule, and liquid crystallinity giant molecules, such as liquid crystallinity polycondensation giant molecules, such as a polyamide which combined the optical active group, polyimide, and polyester, a liquid crystallinity polyaddition reaction giant molecule like polyurethane, or liquid crystallinity Pori cinnamic acid vinyl, found out that the engine performance which was excellent in the orientation property was shown. Use as the orientation film the liquid crystallinity macromolecule thin film which has an optical active group in this invention, and the linearly polarized light is irradiated at this thin film. Subsequently, after irradiating the linearly polarized light which has a different polarization shaft through the mask of the shape of an another micro pattern, it sets at the process which makes a dichroism

molecule arrange in the shape of a micro pattern on this thin film. a substrate -- receiving -- the pressure of the range of specification [a perpendicular direction] -- ** or ** -- the contrast between the patterns with which resolution is high and optical axis differ became possible [obtaining a very large micro pattern polarizing element] by the manufacture approach which applies a dichroism molecule solution like.

[0011] Namely, this invention forms the liquid crystallinity macromolecule thin film which has an optical active group on (1) substrate. In the process which makes a dichroism molecule arrange in the shape of a micro pattern on this thin film after irradiating the linearly polarized light at this thin film and irradiating the linearly polarized light which has a polarization shaft different subsequently through the mask of the shape of an another micro pattern a substrate -- receiving -- a perpendicular direction -- the pressure of 0.01MPa-1.0MPa -- ** or ** -- the manufacture approach of the polarizing element which applies a dichroism molecule solution like -- (2) The manufacture approach of a polarizing element given in (1) whose a dichroism molecule solution is a solution containing an anion system surfactant, The anion system surface active agent in (3) and (2) Polyoxyethylene lauryl ethereal sulfate sodium, A polyoxyethylene-alkyl-ether sodium sulfate, polyoxyethylene-alkyl-ether sulfuric-acid triethanolamine, A polyoxyethylene-alkyl-phenyl-ether sodium sulfate, sodium lauryl sulfate, The manufacture approach of a polarizing element given in (2) which is one sort chosen from the group which consists of a lauryl ammonium sulfate and lauryl sulfuric-acid triethanolamine, or two sorts or more, (1) whose optical active group in (4), (1), or (3) is one sort chosen from the group which consists of N=N of non-aromaticity, C=C of non-aromaticity, and C=N of non-aromaticity, or two sorts or more and which comes out and exists thru/or the manufacture approach of the polarizing element of (3), and [0012] The liquid crystallinity macromolecule thin film in (5), (1), or (3) A polyamide, (1) which is polyimide, polyester, and a polyurethane resin thin film thru/or the manufacture approach of the polarizing element of (3), (1) whose liquid crystallinity giant-molecule thin film in (6), (1), or (3) is a Pori cinnamic acid vinyl resin thin film thru/or the manufacture approach of the polarizing element of (3), (1) whose dichroism molecule in (7), (1), or (3) is coloring matter which has lyotropic liquid crystal nature thru/or the manufacture approach of the polarizing element of (3), The manufacture approach of the polarizing element of (7) that the coloring matter which has the lyotropic liquid crystal nature of (8) and (7) is coloring matter which has a hydrophilic substituent, In (9) and (8) a hydrophilic substituent A sulfonic group, a carboxylic-acid radical, The manufacture approach of the polarizing element of (8) which is one or more radicals chosen from the group which consists of an amino group and a hydroxyl group, (1) to which the exposure of the linearly polarized light in (10), (1), or (3) is performed using the laser beam which has polarizability thru/or the manufacture approach of the polarizing element of (3), (11) It is the liquid crystal display which has the vertical substrate which counters, and is related with the three dimensional display equipment which is the substrate with which at least one side of this substrate has the polarizing element of a publication in any 1 term of (1) thru/or (10).

[0013] Although a liquid crystallinity macromolecule is a macromolecule in which liquid crystallinity is shown under a certain conditions, the macromolecule in which the so-called lyotropic liquid crystal nature is shown under existence of a solvent, and the thermotropic liquid crystal nature macromolecule in which liquid crystal structure is

shown without mediation of a solvent in the state of melting are known. Generally, the liquid crystallinity macromolecule had the layer in which the chain of a molecule carried out orientation to altitude in the flow direction in the state of liquid crystal, and high intensity and a high elasticity ingredient have been obtained by fixing the orientation condition. In addition, many researches done the orientation film of a low-molecular nematic liquid crystal can also be seen recently using a stacking tendency with an advanced liquid crystallinity giant-molecule thin film.

[0014] It uses that the liquid crystallinity macromolecule which has an optical active group in this invention can fully control the orientation of the dichroism molecular layer which has the lyotropic liquid crystal nature by which a stacking tendency with the advanced thin film of this macromolecule is formed on it.

[0015] Carrying out orientation of the liquid crystal compound by various electric fields and outside place like a magnetic field is known. The orientation by electric field and the magnetic field is known well. In addition, orientation is carried out also by the own flow of a liquid crystal compound called flow orientation. Moreover, even if it applies shearing stress, improving orientation to the direction of the force is known. It is observed that the dichroism molecule solution used in this invention also carries out various orientation in response to the effect of an external stimulus in the state of a lyotropic liquid crystal. Although a dichroism molecule solution is applied and it was made to arrange in the shape of a micro pattern in this invention, it turned out that the effect of various outside places which do not agree for this purpose must be avoided as much as possible.

[0016]

[The mode of implementation of invention] Hereafter, this invention is explained to a detail. The liquid crystallinity macromolecule which has the optical active group used by this invention is a liquid crystallinity macromolecule which causes molecule shaft orientation change of an optical active group by linearly polarized light exposure. Molecule shaft orientation change said here means the phenomenon which changes the molecule shaft orientation in the fixed direction according to the linearly polarized light, after absorbing the light energy of the linearly polarized light.

[0017] All the radicals that have the property to cause molecule shaft orientation change of an optical active group by such linearly polarized light exposure are contained in the optical active group in this invention. as such an optical active group -- $N=N$, $C=C$, and $C=N$ -- since -- the radical the double bond of whose is non-aromaticity is mentioned including at least one selected double bond.

[0018] As a radical which has $N=N$ association of non-aromaticity, aromatic series azoes, such as an azobenzene radical, an azo naphthalene radical, bis-azo, and a formazan radical, an azoxybenzene radical, etc. can be mentioned. As a desirable thing of these radicals, it is for example, following type- $N=N-A-X-OCO(CH_2) PO-p-phe-N=N-B-Y-A-N=N-p-phe-Y$ (the inside A and B of a formula the benzene ring or the naphthalene ring which may have the substituent). an alkyl group [in / X expresses the alkoxy group or II ($C1-C3$) alkylamino radical of ($C1-C10$), and / a dialkylamino radical] -- both -- it may be the same, you may differ again, and unsubstituted, one of the two, or both may be permuted by the cyano group or the hydroxy group. Y A hydrogen atom, a fluorine atom, a chlorine atom, a nitro group, a cyano group, an alkyl group ($C1-C10$), An alkoxy group, an alkylloxy ($C1-C4$) carbonyl vinyl group, ($C1-C10$) monochrome or a II ($C1-C3$)

alkylamino radical -- respectively -- expressing -- the alkyl group of this monochrome or a JI (C1-C3) alkylamino radical -- a permutation or unsubstituted -- any are sufficient, and in the case of a JI (C1-C3) alkylamino radical, two alkyl groups may be the same, or may differ. Moreover, a cyano group or a hydroxy group is mentioned as a substituent on this alkyl group. As the monochrome permuted by the cyano group or the hydroxy group, or a JI (C1-C3) alkylamino radical, a dihydroxy ethylamino radical, a hydroxy (C1-C3) alkylamino radical, a dicyano ethylamino radical, or a cyano ethyl (C1-C3) alkylamino radical is mentioned. Moreover, p expresses the integer of 1-10, phe shows the benzene ring, and it is shown that p-phe or o-phe has combined with the contiguity atom with the para position or the ortho position. The radical expressed is mentioned.

[0019] As a radical which has C=C association of non-aromaticity, radicals which it has, such as a polyene, a stilbene, still BAZORU, still BAZORIUMU, cinnamic acid, ISHIJIGO, a thioindigo, and a hemi thioindigo, are mentioned. As a desirable thing of these radicals, it is for example, following type-CH=C (X1) (X2).

(One of the two shows a hydrogen atom, aromatic series 6 membered-ring and alkoxy (C1-C3) carbonyl group in which another side may have a substituent are shown by the inside X1 and X2 of a formula, or it joins together and it shows X1 and (X2) the radical shown by -S-o-phe-CO-) o-phe may show the same semantics as the above, and may have the substituent. What was indicated by said Y as a substituent on aromatic series 6 membered-ring and a phe radical is mentioned. The radical expressed is mentioned. As aromatic series 6 membered-ring, the benzene ring which may have substituents, such as Y, for example, the pyridine ring combined with -CH=C radical by the carbon atom can be mentioned, and this pyridine ring may be permuted by the carbon number 1 thru/or the alkyl group of 10 on the nitrogen atom.

[0020] As a radical which has C=N association of non-aromaticity, an aromatic series Schiff base, an aromatic series hydrazone radical, etc. can be mentioned, and it is following formula-NH-N=C (X3) (X4) as a desirable thing.

- N=CH-B-Y-A-CH=N-p-phe-Y (the radical or low-grade alkoxy carbonyl group one of the two indicates a hydrogen atom or a low-grade alkoxy carbonyl group to be, and another side is indicated to be by -B-Y is shown by the inside X3 and X4 of a formula, or both X3 and X4 join together, and it shows the radical shown by -CH=N-N(low-grade alkyl)-CO-) Moreover, A, B, Y, p-phe, etc. show the same semantics as the above. The radical expressed is mentioned.

[0021] The wavelength of the light which the liquid crystallinity macromolecule which has these optical active groups absorbs does not remain in the thing of a light region, but the thing of the field of ultraviolet rays or infrared radiation is also contained. If the linearly polarized light which includes the wavelength range which this compound absorbs in the thin film of the liquid crystallinity macromolecule which has these optical active groups is irradiated, molecule shaft orientation change will be caused easily.

[0022] A liquid crystallinity polyaddition reaction macromolecule like polyurethane, liquid crystallinity Pori cinnamic acid vinyl, etc. which combined liquid crystallinity polycondensation macromolecules and optical active groups, such as a polyamide which combined for example, the optical active group as a liquid crystallinity macromolecule which has the optical active group used by this invention, this polyimide, and this PORIESUTERU, can be mentioned. the homopolymer to which the monomer in which this liquid crystallinity macromolecule has an optical active group was made to react, the

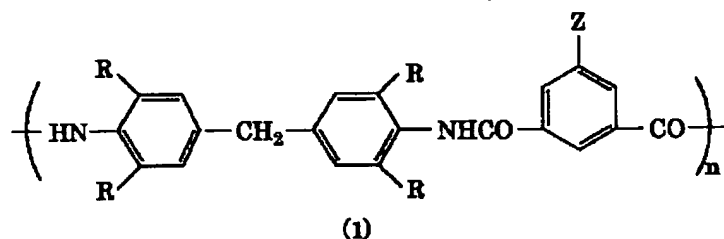
monomer which has an optical active group, and a monomer without an optical active group -- any of the copolymer to which the desirable monomer of the same kind was made to react are sufficient. the monomer which does not have an optical active group to one mol of monomers which have an optical active group in the case of this copolymer -- the less than 100-mol polymer which came out of comparatively and which carried out the polymerization is desirable in a desirable monomer of the same kind, and the polymer of less than 50 mols of monomers of the same kind which do not have an optical active group more preferably which came out of comparatively and which carried out the polymerization is desirable.

[0023] The copolymer which is a mol rate and includes more preferably the homopolymer which has the substructure shown by following general formula (1) - (4) as a concrete example of this liquid crystallinity macromolecule and, by which the whole macromolecule is substantially constituted from this substructure, the homopolymer of liquid crystallinity Pori cinnamic acid vinyl, this substructure, or the substructure corresponding to cinnamic acid vinyl 2% or more about 1% or more can be mentioned. The following compounds can be mentioned as a concrete example of a liquid crystallinity high molecular compound.

[0024] The following general formula (1)

[0025]

[Formula 1]



[0026] (The inside R of a formula expresses a methyl group, an ethyl group, i-propyl group, or a chlorine atom, and n expresses the integer of 5-10000, respectively.) Z expresses the radical shown by following type (a) - (e).

[0027] (a)-N=N-A-X(b)-CH=C(X1)(X2)

(c)-NH-N=C(X3)(X4)

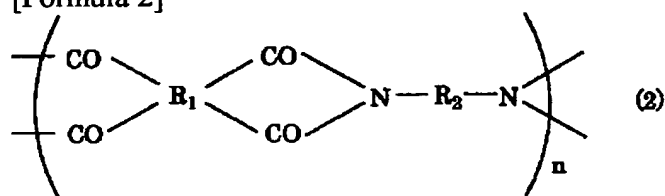
(d) -N=CH-B-Y(e)-OCO(CH₂) PO-p-phe-N=N-B-Y [0028] an alkyl group [in / as for the inside A of a formula, X expresses the alkoxy group or II (C1-C3) alkylamino radical of (C1-C10) for the benzene ring or the naphthalene ring which may have the substituent, and / a dialkylamino radical] -- both -- it may be the same, you may differ again, and unsubstituted, one of the two, or both may be permuted by the cyano group or the hydroxy group. Moreover, one of the two shows a hydrogen atom, and X1 and X2 show aromatic series 6 membered-ring and alkoxy (C1-C3) carbonyl group in which another side may have a substituent, or X1 and X2 join together, and they show the radical shown by -S-o-phe-CO-. Moreover, X3 and X4 show the radical or low-grade alkoxy carbonyl group one of the two indicates a hydrogen atom or a low-grade alkoxy carbonyl group to be, and another side is indicated to be by -B-Y, or both X3 and X4 join together, and they show the radical shown by -CH=N-N(low-grade alkyl)-CO-. B moreover, the benzene ring or the naphthalene ring which may have the substituent Y A hydrogen atom, a fluorine atom, a chlorine atom, a nitro group, a cyano group, an alkyl group (C1-C10),

An alkoxy group, an alkyloxy (C1-C4) carbonyl vinyl group, (C1-C10) monochrome or a JI (C1-C3) alkylamino radical -- expressing -- the alkyl group of this monochrome or a JI (C1-C3) alkylamino radical -- a permutation or unsubstituted -- any are sufficient, and in the case of a JI (C1-C3) alkylamino radical, two alkyl groups may be the same, or may differ. Moreover, a cyano group or a hydroxy group is mentioned as a substituent on this alkyl group. As the monochrome permuted by the cyano group or the hydroxy group, or a JI (C1-C3) alkylamino radical, a dihydroxy ethylamino radical, a hydroxy (C1-C3) alkylamino radical, a dicyano ethylamino radical, or a cyano ethyl (C1-C3) alkylamino radical is mentioned. Moreover, p expresses the integer of 1-10, phe shows the benzene ring, and it is shown that p-phe or o-phe has combined with the contiguity atom with the para position or the ortho position. Polyamide compound which has the substructure expressed.

[0029] The following general formula (2)

[0030]

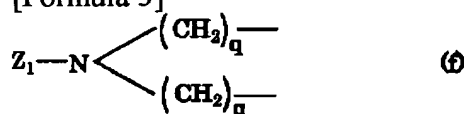
[Formula 2]



[0031] (As for the inside R1 of a formula, the residue of alicyclic or ring tetracarboxylic acid and n' show the integer of 2-10000, and R2 shows the radical which has the optical active group expressed with the following type (f) or a formula (g).)

[0032]

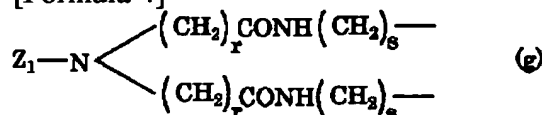
[Formula 3]



[0033] (The radical expressed with (f-a) Y-p-phe-N=N-BO-(f-b) Y-p-phe-N=CH-BO-(f-c) Y-p-phe-CH=N-BO-(f-d) (X1) (X2) CH=CH-B- is shown by the inside Z1 of a formula.) BO shows B or -C6H4O(CH2) PCOO-B-, and each notation of Y in a formula, p-phe, (X1), (X2), and B and p shows the same semantics as the above. Moreover, q shows the integer of 2-4. Or the following type (g)

[0034]

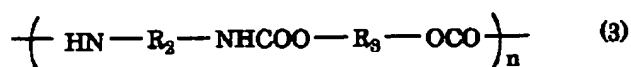
[Formula 4]



[0035] (-- the same semantics as the above is shown by the inside Z1 of a formula, r shows the integer of 1-5 and s shows the integer of 2-8, respectively.) -- the polyimide compound and the following general formula (3) which have the substructure expressed

[0036]

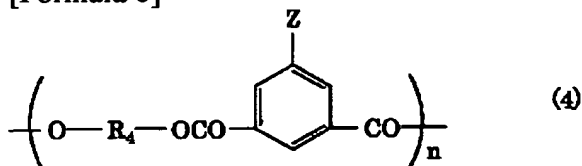
[Formula 5]



[0037] (As for the inside R2 of a formula, the same semantics is expressed also in said general formula (2), R3 expresses $-(\text{CH}_2)_m$, and m expresses 2-8.) n expresses the integer of 5-10000. The polyurethane compound, the following general formula (4) which have the substructure expressed

[0038]

[Formula 6]



[0039] (The same semantics as said general formula (1) is shown by the inside Z of a formula.) Moreover, R4 expresses the benzene ring, a naphthalene ring, and C4 - C6 methylene groups (a tetramethylen radical, hexamethylene radical, etc.), and n expresses the integer of 5-10000. Polyester compound which has the substructure expressed.

[0040] In the above, the following can be mentioned as a desirable thing.

(1) Set to a general formula (1) and Z is the $-\text{N}=\text{N}-\text{A}-\text{X}$ (aforementioned [a]). Or polyamide compound which has the substructure which is $-\text{OCO}(\text{CH}_2)_p-\text{phe}-\text{N}=\text{N}-\text{B}-\text{Y}$ (aforementioned [e]).

(2) The polyimide compound or polyurethane compound which has the substructure whose Z1 in (f) or (g) is $\text{Y}-\text{p}-\text{phe}-\text{N}=\text{N}-\text{A}-$ in a general formula (2) and (3).

(3) The polyester compound which has the substructure of a general formula (4).

(4) The homopolymer or copolymer of liquid crystallinity Pori cinnamic acid vinyl.

[0041] In these, the liquid crystallinity polycondensation macromolecule and a liquid crystallinity polyaddition reaction macromolecule like polyurethane like the polyamide compound of above-mentioned (1) - (3), a polyimide compound, and a polyester compound can prepare the 2 organic-functions monomer which has an optical active group, can make another organic-functions monomer able to react by equimolar, and can obtain a desired liquid crystallinity macromolecule (homopolymer). When manufacturing a copolymer, the 2 organic-functions monomer of the same kind which does not have for example, an optical functional group with the 2 organic-functions monomer which has an optical active group can be used together, and the liquid crystallinity macromolecule which consists of a desired copolymer can be obtained by making it react by equimolar like the above. The amount of association of the optical active group in a high molecular compound can be adjusted by changing the operating rate of the monomer which has an optical active group, and the monomer of the same kind which does not have an optical active group. as the 2 organic-functions monomer which has an optical active group, and another [which does not have the optical active group made to react] 2 organic-functions monomer -- for example, 4 and 4'-diamino - 3, 5, 3', and 5' - tetra-R permutation diphenylmethane (R shows the semantics same in said general formula (1).), alicyclic or ring tetracarboxylic acid, the aliphatic series dicarboxylic acid of carbon numbers 2-8,

etc. can be mentioned. Through a bridge formation radical, the condensed ring which has two carboxyl groups on alicyclic [of four to carbon number 6 membered-ring] or the ring which has alicyclic [of four to carbon number 6 membered-ring] or ring tetracarboxylic acid, the condensed-ring tetracarboxylic acid that has four carboxyl groups on the condensed ring of carbon numbers 8-10, or two carboxy groups as alicyclic or ring tetracarboxylic acid, or the condensed ring of carbon numbers 8-10 does not mind, carries out, and the tetracarboxylic acid combined two is mentioned. Although there is especially no limit as a bridge formation radical, they are a low-grade alkylene group, CO, a nitrogen atom, an oxygen atom, etc.

[0042] Moreover, the homopolymer of the liquid crystallinity cinnamic acid vinyl of the above (4) is obtained by carrying out the polymerization of the cinnamic acid vinyl monomer. In obtaining a copolymer, and it does not check suitable inside ***** which can be copolymerized, by carrying out a polymerization with the monomer which does not have an optical active group, the liquid crystallinity macromolecule which consists of a desired copolymer can be obtained. The amount of association of the optical active group in a high molecular compound can be adjusted by changing the operating rate of a cinnamic acid vinyl monomer and the monomer which does not have an optical active group. In order to obtain a copolymer, as a monomer which does not have the optical active group which carries out copolymerization to a cinnamic acid vinyl monomer, for example, 4-(4'-n-pentyl phenyl) styrene, 4-(4'-n-hexyl phenyl) styrene, 4-(4'-n-pentyl cyclohexyl) styrene, 4-(4'-n-hexyl Sickle hexyl) styrene, etc. are mentioned.

[0043] although the operating rate with the monomer which does not have the optical active group made to react with the 2 organic-functions monomer which has an optical active group, and the 2 organic-functions monomer which has this optical active group in order to obtain a copolymer is based also on the structure of a monomer -- 1:0-1:100 -- it is the range of 1:0 to 1:50 more preferably.

[0044] What is necessary is just to usually perform a polymerization reaction by the solution polymerization method in the inside of a solvent etc. according to the well-known method of acquiring a polyamide compound, a polyimide compound, a polyurethane compound or a polyester compound, and a Pori cinnamic acid vinyl polymerization object conventionally.

[0045] Although it does not generally have ***** since especially a limit does not have the liquid crystallinity macromolecule which has the optical active group used by this invention obtained as mentioned above about the polymerization degree and it changes with the class of resin, classes of optical active group, etc., it is usually [two or more] about [ten or more to] 10000 still more preferably five or more preferably.

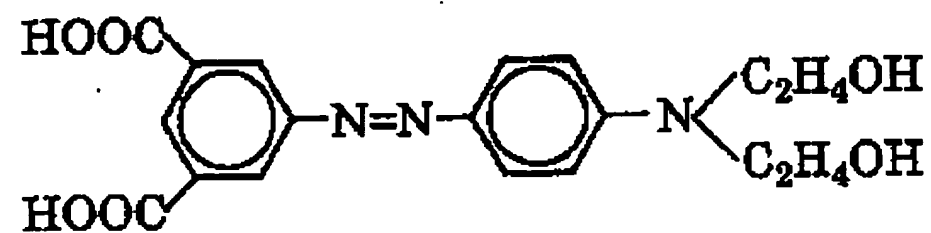
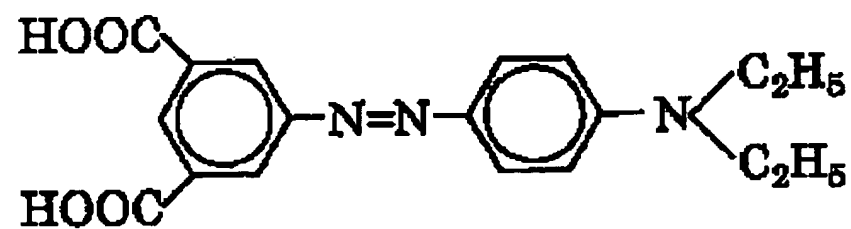
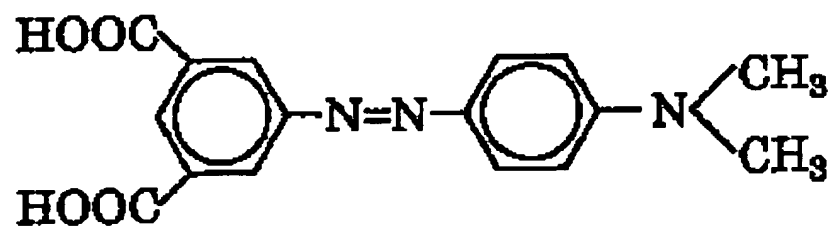
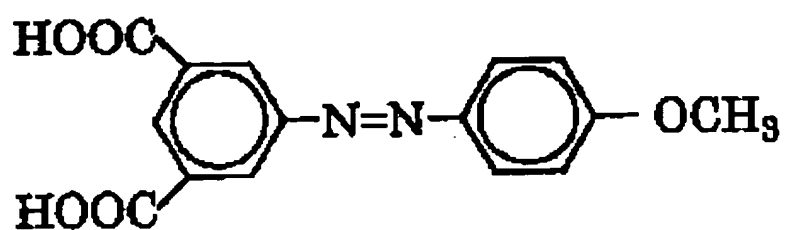
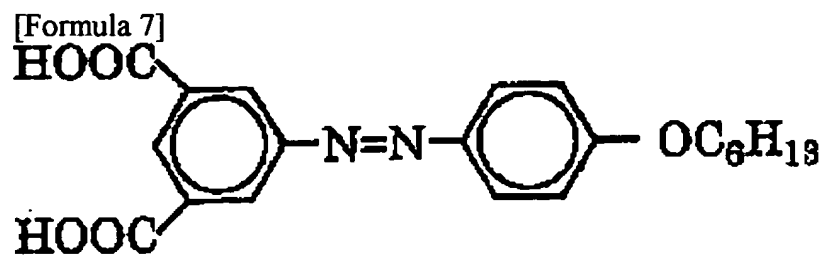
[0046] As a 2 organic-functions monomer which has an optical active group, the II [amino (C2-C4) alkyl] amine by which the nitrogen atom permuted by the alt.phthalic acid and two alkyl groups which have an optical active group on the benzene ring, for example is further permuted by the optical active group is mentioned.

[0047] Although the example of a 2 organic-functions monomer of having an optical active group used as the raw material of the liquid crystallinity macromolecule used by this invention is shown below, these are mere instantiation and are not limited to these.

[0048] (1) The object which carries out the following as a monomer with the radical which has N=N association of non-aromaticity as an optical active group is mentioned.

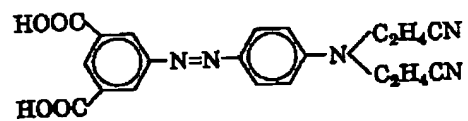
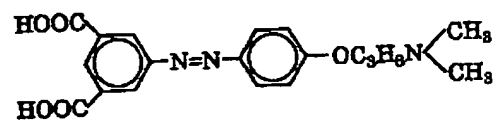
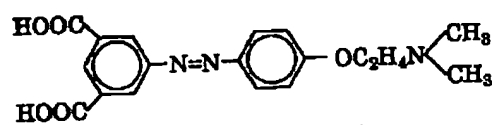
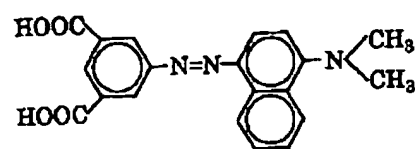
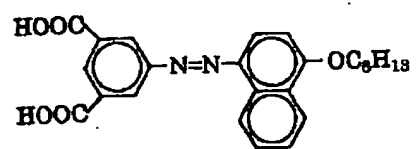
** The monomer suitable for a polyamide compound or polyester compounds [0049]

[Formula 7]



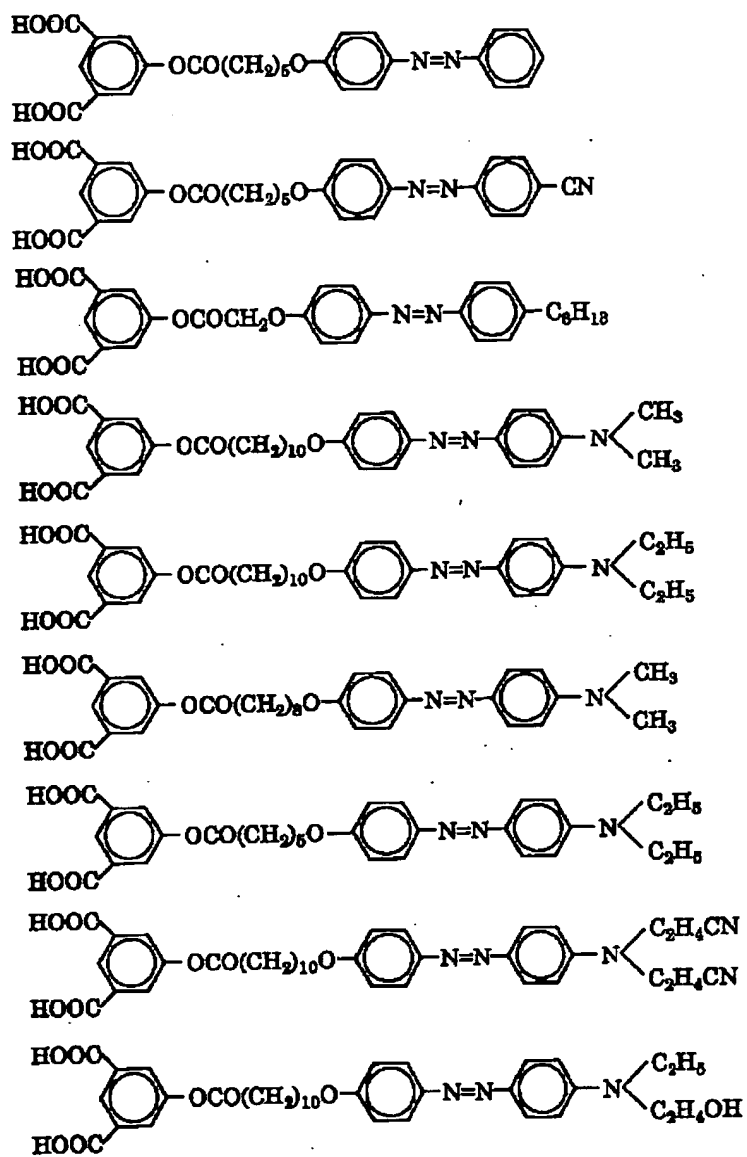
[0050]

[Formula 8]



[0051]

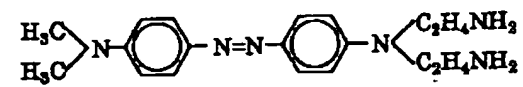
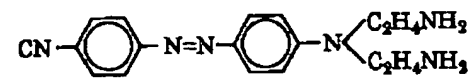
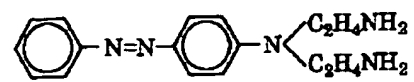
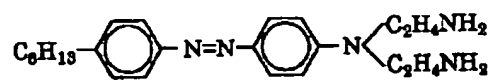
[Formula 9]



[0052] ** The monomer suitable for a polyimide compound or a polyurethane compound

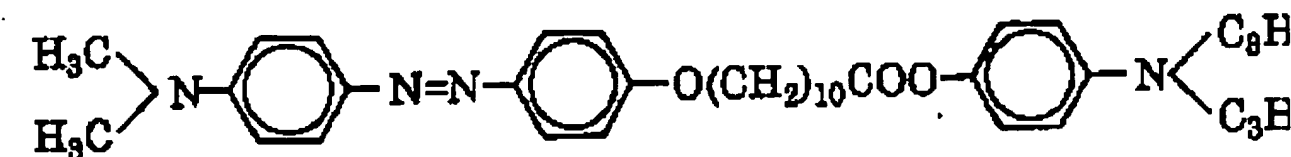
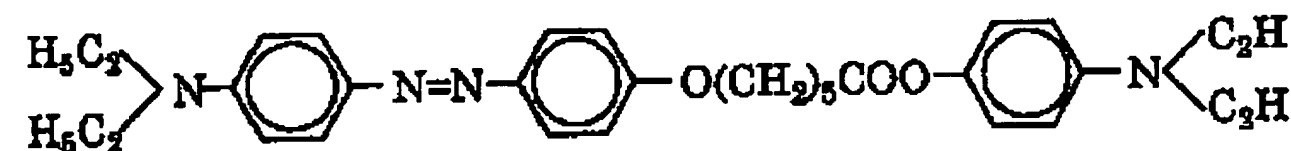
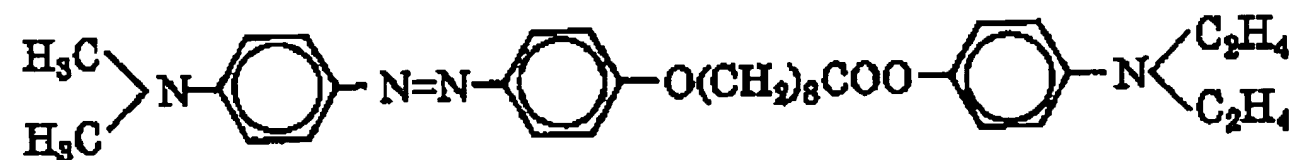
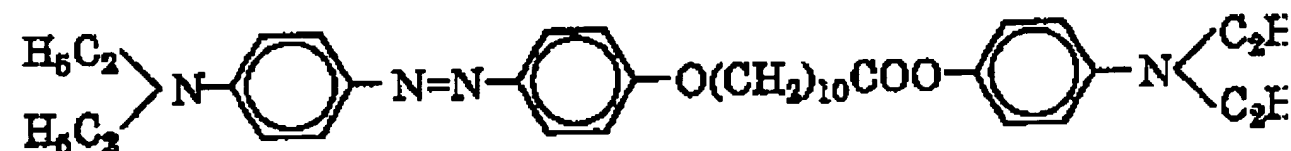
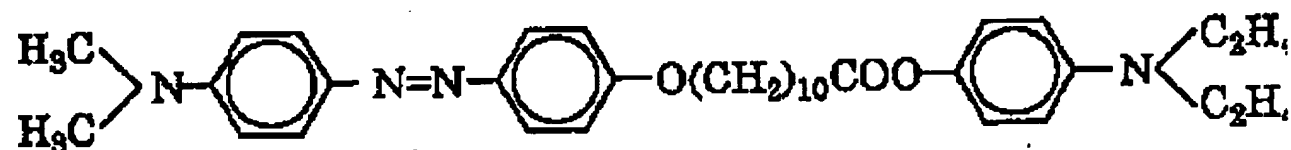
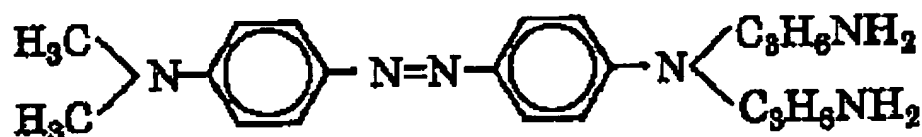
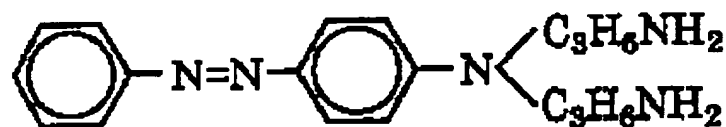
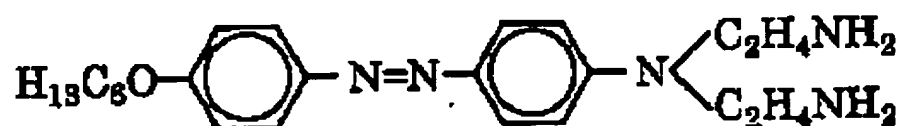
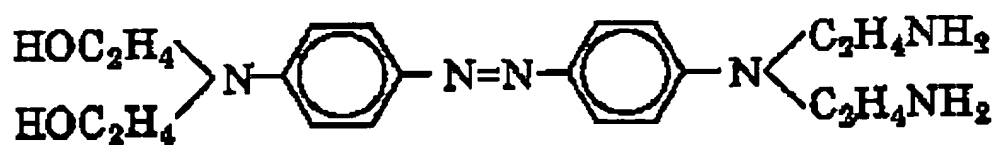
[0053]

[Formula 10]



[0054]

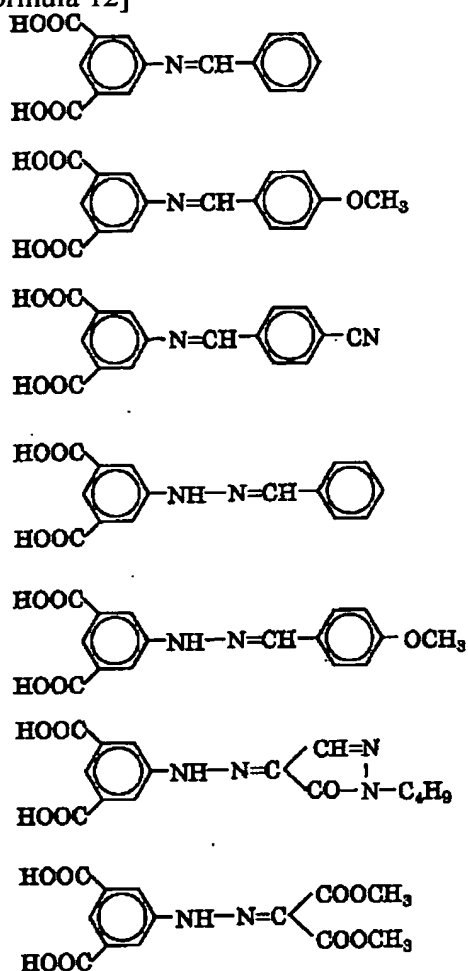
[Formula 11]



[0055] (2) The object which carries out the following as a monomer with the radical which has C=N association of non-aromaticity as an optical active group is mentioned.

** The monomer suitable for a polyamide compound or polyester compounds [0056]

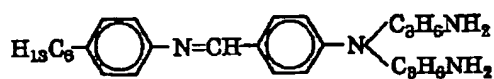
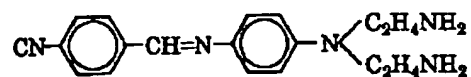
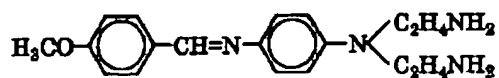
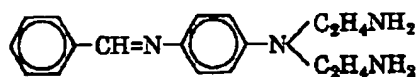
[Formula 12]



[0057] ** The monomer suitable for a polyimide compound or a polyurethane compound

[0058]

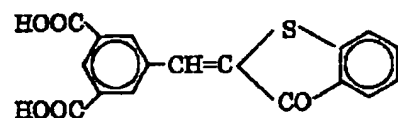
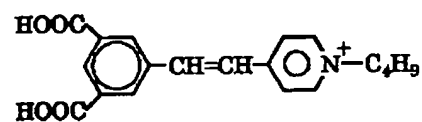
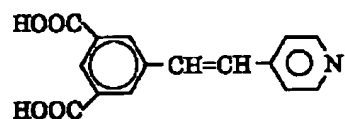
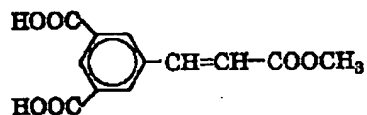
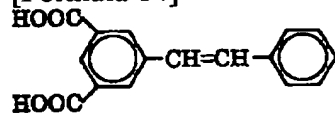
[Formula 13]



[0059] (3) The object which carries out the following as a monomer with the radical which has C=C association of non-aromaticity as an optical active group is mentioned.

** The monomer suitable for a polyamide compound or polyester compounds [0060]

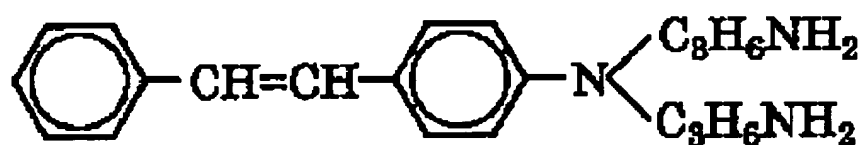
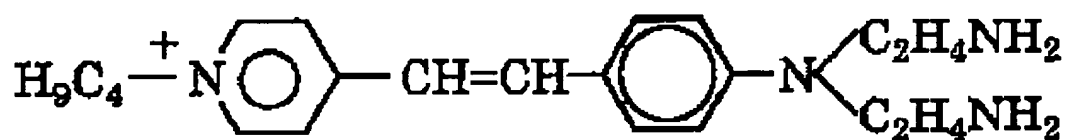
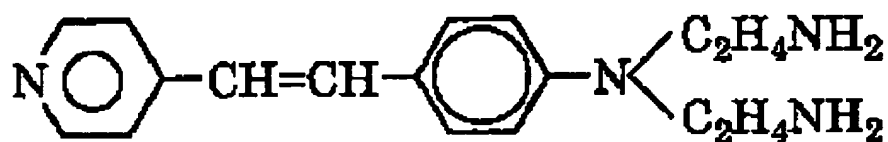
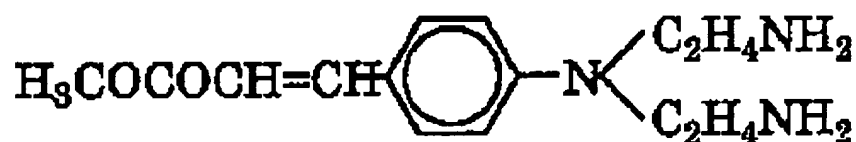
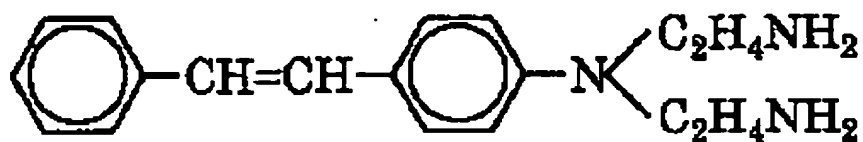
[Formula 14]



[0061] ** The monomer suitable for a polyimide compound or a polyurethane compound

[0062]

[Formula 15]



[0063] As an approach of preparing the thin film of the liquid crystallinity high molecular compound which has such an optical active group on a substrate (a plastic plate like glass or a polycarbonate, and polyester being used as a substrate), the rotation applying method is desirable. Moreover, this kind of liquid crystallinity giant-molecule thin film may be prepared on a substrate by the Langmuir-Blodgett's technique. Furthermore, a substrate may be made to immerse and stick to these liquid crystallinity polymer solutions. 0.001-5 micrometers of thickness are usually 0.01-1 micrometer preferably. When preparing these thin films, this liquid crystallinity macromolecule is usually dissolved in a suitable solvent, and it is used as a liquid crystallinity polymer solution. Although the concentration of this liquid crystallinity macromolecule in a solution cannot generally be said since suitable concentration changes with the class of this liquid crystallinity

macromolecule, polymerization degree, the method of application, thickness to wish, it is usually 0.1 % of the weight - about 10 % of the weight, and is 0.5 % of the weight - about 5 % of the weight preferably. By the method of application to be used, suitable concentration can carry out a preliminary trial and can opt for it easily. Although it will not be limited especially if this liquid crystallinity giant molecule is dissolved as a solvent used, aprotic polar solvents, such as a pyridine, dimethylformamide, dimethyl sulfoxide, N-methyl pyrrolidinone, dimethylacetamide, and dimethyl imidazoline, are mentioned as a desirable example.

[0064] Various approaches well-known as an approach of irradiating the linearly polarized light are applicable to the thin film of the liquid crystallinity macromolecule which has the optical active group prepared on the substrate. What is necessary is just to irradiate the linearly polarized light at this thin film through the mask pattern which it is required to be burned on the liquid crystallinity macromolecule thin film which has an optical active group, and wishes to have a polarization pattern for that purpose, in order to manufacture a micro pattern polarizing element. Or what is necessary is to condense the laser beam which has polarizability using a lens etc., to operate it, and just to irradiate in the shape of a pattern. Exposure energy has the desirable range of 0.1 mJ/cm² to 10 J/cm². The molecule shaft orientation change by the linearly polarized light exposure of this thin film is reversible, and can carry out overwrite of the pattern freely by irradiating the linearly polarized light of a different polarization shaft for every mask pattern. In addition, if one polarizing element (plate) which has a complicated pattern is manufactured, many polarizing elements (plate) which have the conventionally difficult complicated pattern by using the polarizing element (plate) as a mask pattern can be manufactured by the simple approach of a linearly polarized light exposure.

[0065] Thus, only by applying a dichroism coloring matter molecule to the liquid crystallinity macromolecule thin film which has the optical active group which the molecule shaft arranged in the fixed direction acquired in the shape of a micro pattern. Namely, only by preparing a dichroism pigment layer in the shape of a micro pattern on this thin film. It arranges in the direction in which the molecule shaft of a dichroism coloring matter molecule was specified with the polarization shaft of the linearly polarized light with which it irradiated, the array direction, i.e., this thin film, of a molecule shaft of an optical active group, and a polarization shaft is fixed, and the property as a micro pattern polarizing element is demonstrated. If this thing is explained still more concretely, on the substrate which has the liquid crystallinity macromolecule thin film which has the optical active group which the molecule shaft arranged in the fixed direction, the solution of dichroism coloring matter is applied, under desired temperature and humidity condition, a solvent will be evaporated and this micro pattern-like coloring matter thin film will be formed. Under the present circumstances, the molecule shaft of this coloring matter is arranged in the direction specified with the polarization shaft of the linearly polarized light which irradiated the liquid crystallinity macromolecule thin film which has an optical active group, the absorption-of-light shaft of this coloring matter thin film is fixed, and the property as a micro pattern polarizing element is demonstrated.

[0066] The dichroism coloring matter solution used by this invention has the property which is easy to carry out orientation in the stress direction, if shearing stress parallel to a substrate is applied in the case of spreading. Even if it was the substrate which produced

the orientation latent image for optical orientation, in order that the orientation restraining force according [the part in which shearing stress was added on the occasion of spreading of a dichroism coloring matter solution] to shearing stress might exceed optical orientation restraining force, it turned out that the micro pattern of optical orientation disappears. Therefore, in order to give priority to optical orientation restraining force and to realize orientation of a micro pattern, it turned out that it becomes an important technique how shearing stress parallel to the substrate at the time of spreading is mitigated. Namely, use as the orientation film the liquid crystallinity macromolecule thin film which has an optical active group, and the linearly polarized light is irradiated at this thin film. Subsequently, after irradiating the linearly polarized light which has a different polarization shaft through the mask of the shape of another micro pattern, it sets at the process which makes a dichroism molecule arrange in the shape of a micro pattern on this thin film. a substrate -- receiving -- parallel shearing stress -- not being added -- and a perpendicular direction -- 0.01MPa-1.0MPa -- desirable -- the pressure of 0.05MPa-0.5MPa -- ** or ** -- by the manufacture approach which applies a dichroism molecule solution like The contrast between the patterns with which resolution is high and optical axis differ became possible [obtaining a very large micro pattern polarizing element]. Although there are roll coater spreading, flexographic printing, screen-stencil, curtain coating-machine spreading, spray-coater spreading, etc. as the advantageous coating approach when controlling such a pressure, roll coater spreading, curtain coating-machine spreading, spray-coater spreading, etc. are especially desirable.

[0067] The dichroism coloring matter (molecule) solution used by this invention shows liquid crystallinity in fixed concentration and a fixed temperature requirement. A certain kind of surface active agent showed the effectiveness which raises the nematic liquid crystallinity of a dichroism coloring matter solution. The dichroism coloring matter which is an aromatic compound has taken the column laminated structure in the liquid crystal phase. Although it is known that a surfactant also shows a lyotropic liquid crystal phase, a different phase from the lyotropic liquid crystal phase of an aromatic compound is taken in many cases. Therefore, if the dichroism coloring matter solution containing a surfactant becomes high concentration, the field of only the surfactant with which a coloring matter liquid crystal phase and a surfactant liquid crystal phase do not contain lifting coloring matter for phase separation will be generated. although this phenomenon is observed as a pinhole which does not have coloring matter in the spreading film of a dichroism coloring matter solution -- this -- a surfactant -- it is especially improved notably with an anionic surface active agent. An object desirable also among anionic surface active agents a polyoxyethylene-alkyl-ether sulfate -- desirable -- an alkali-metal salt or a low-grade alkanolamine salt -- for example, polyoxyethylene lauryl ethereal sulfate sodium (EMARU -- 20 C) As trade name:Kao Corp. make and other polyoxyethylene-alkyl-ether sodium sulfates, all EMARU E-27C, EMARU E-70C, etc. : For example, EMARU 20CM, REBENORU WX, radio-and-TV mull WX (all trade name : Kao Corp. make), etc., Polyoxyethylene-alkyl-ether sulfuric-acid triethanolamine (EMARU 20T (trade name) etc.) The Kao Corp. make, polyoxyethylene alkylphenyl ether sulfate, It is alkali-metal salt (EMARU NC-35, REBENORU WZ, etc.), for example, a polyoxyethylene-alkyl-phenyl-ether sodium sulfate, preferably. any -- trade name: -- the Kao Corp. make and a lauryl sulfate -- desirable -- a lauryl sulfuric-acid

alkali-metal salt -- Ammonium salt or low-grade alkanolamine salt (EMARU 10, EMARU 0, etc.), for example, sodium lauryl sulfate the Kao Corp. make and a lauryl ammonium sulfate (EMARUAD-25R --) EMARU AD-25 grade and all Trade name:Kao Corp. make, lauryl sulfuric-acid triethanolamine, a higher-alcohol sulfate -- it is a higher-alcohol sulfuric-acid alkali-metal salt (Kao Corp., such as EMARU 40 powder (trade name)), for example, a higher-alcohol sodium sulfate etc., preferably. Use as the orientation film the liquid crystallinity macromolecule thin film which has an optical active group, and the linearly polarized light is irradiated at this thin film. Subsequently, after irradiating the linearly polarized light which has a different polarization shaft through the mask of the shape of an another micro pattern, it sets at the process which makes a dichroism molecule arrange in the shape of a micro pattern on this thin film. Polyoxyethylene lauryl ethereal sulfate sodium, a polyoxyethylene-alkyl-ether sodium sulfate, Polyoxyethylene-alkyl-ether sulfuric-acid triethanolamine, a polyoxyethylene-alkyl-phenyl-ether sodium sulfate, By the manufacture approach which applies the dichroism coloring matter solution containing one or two surfactants or more which were chosen from sodium lauryl sulfate, a lauryl ammonium sulfate, and lauryl sulfuric-acid triethanolamine so that there may be no parallel shearing stress from ** to a substrate It is possible to obtain a micro pattern polarizing element with the very large contrast between the patterns with which resolution is high and optical axis differ. The addition of a desirable surfactant is made to contain more preferably among a dichroism coloring matter solution in 0.05 % of the weight - 0.5% of the weight of the range 0.01 % of the weight to 1% of the weight.

[0068] As a solvent which dissolves dichroism coloring matter, aprotic polar solvents, such as water, alcohols, ether, a pyridine, dimethylformamide (DMF), and dimethyl sulfoxide (DMSO), N-methyl pyrrolidinone (NMP) dimethylacetamide (DMAC) dimethyl imidazoline (DMI), are desirable. The mixed solvent which makes especially water a subject is desirable. Although the amount of mixing of an organic solvent is arbitrary, 0 - 50 % of the weight is desirable especially zero to 70% of the weight. the concentration of desirable dichroism coloring matter -- the dichroism coloring matter solution whole -- receiving -- usually -- 30 or less % of the weight -- desirable -- 20 or less % of the weight -- more -- desirable -- 15 or less % of the weight extent -- usually -- it is 0.8 % of the weight or more more preferably 0.5% of the weight or more 0.1% of the weight or more. The temperature and the humidity conditions which the solvent of a dichroism coloring matter solution is evaporated and form this coloring matter thin film are important conditions which influence the engine performance as a polarizing element of this coloring matter thin film. although this condition is determined by the class, coloring matter concentration, coating thickness, etc. of a solvent presentation and coloring matter -- temperature -- 0-200 degrees C -- desirable -- 5-50 degrees C and humidity -- 20 - 80%RH -- it is 40 - 70%RH extent preferably.

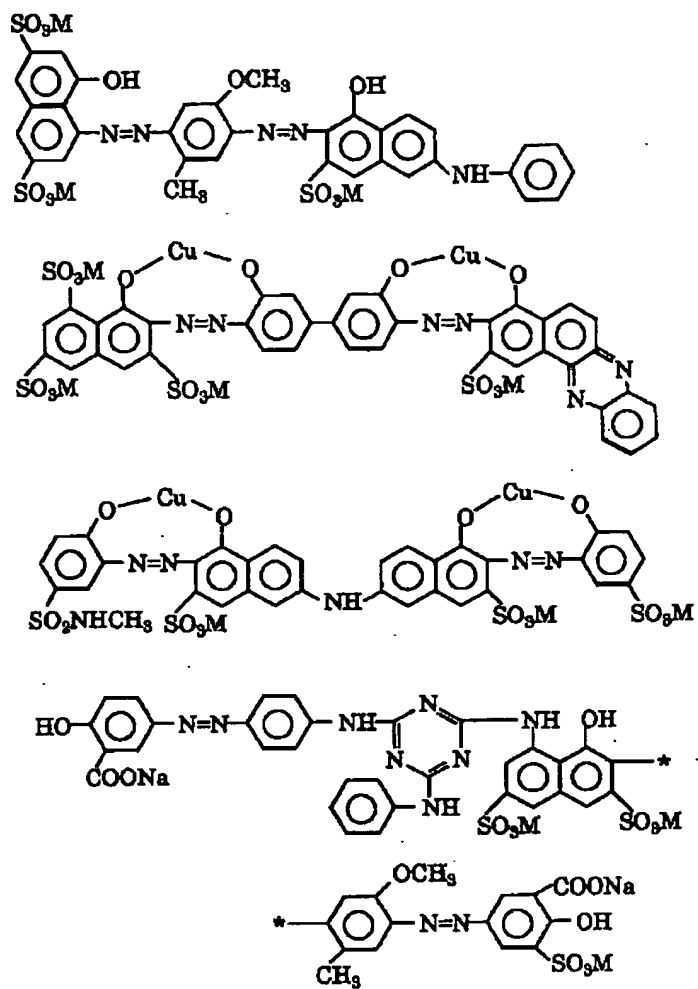
[0069] The dichroism coloring matter used by this invention forms the aggregate which is the compound in which lyotropic liquid crystal nature is shown under certain solvent presentation, coloring matter concentration, and temperature conditions, and is called KUROMO nick liquid crystal phase and which met, and when this aggregate arranges in the fixed direction, it shows polarizability. Moreover, since two or more molecules are meeting, it has the description of excelling in light fastness-proof. For example, the compound which has an aromatic series system ring structure is desirable. Especially as

an aromatic series system ring structure, the condensed ring with heterocycles, such as a thiazole, a pyridine, a pyrimidine, pyridazine, pyrazine, and a quinoline, or the 4th class salts of these and also these and benzene, naphthalene, etc. other than benzene, naphthalene, an anthracene, and a phenanthrene is desirable. Moreover, it is desirable that hydrophilic substituents, such as a sulfonic group, a carboxylic-acid radical, an amino group, and a hydroxyl group, are introduced into these aromatic series system rings.

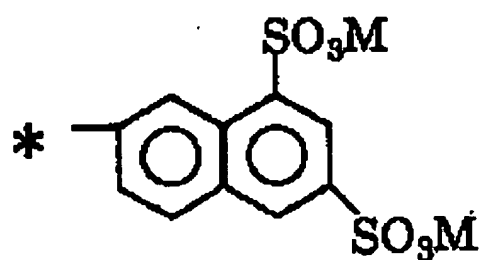
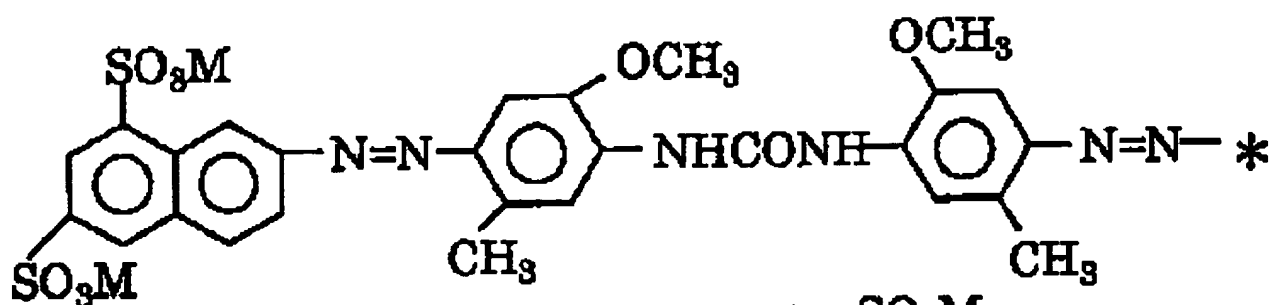
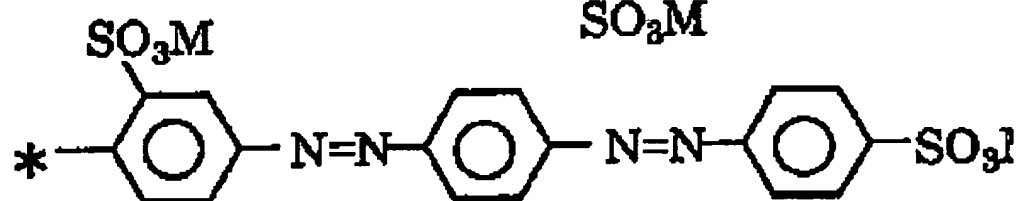
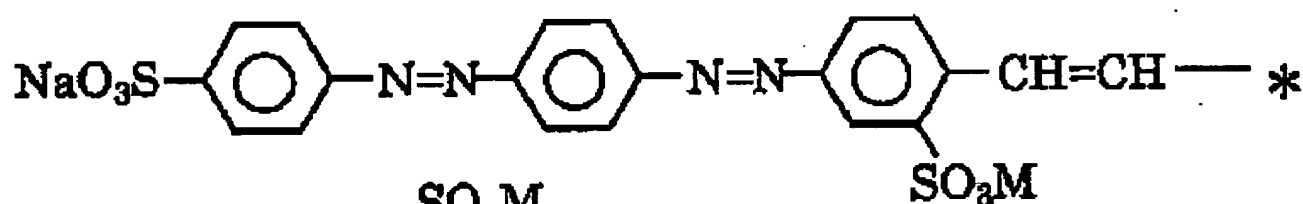
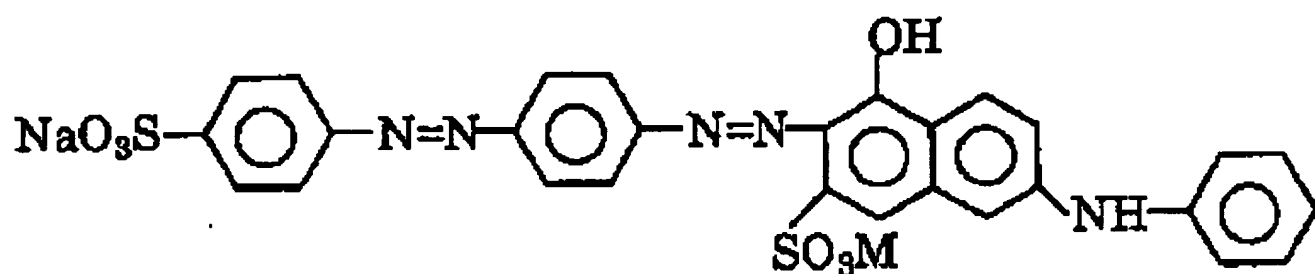
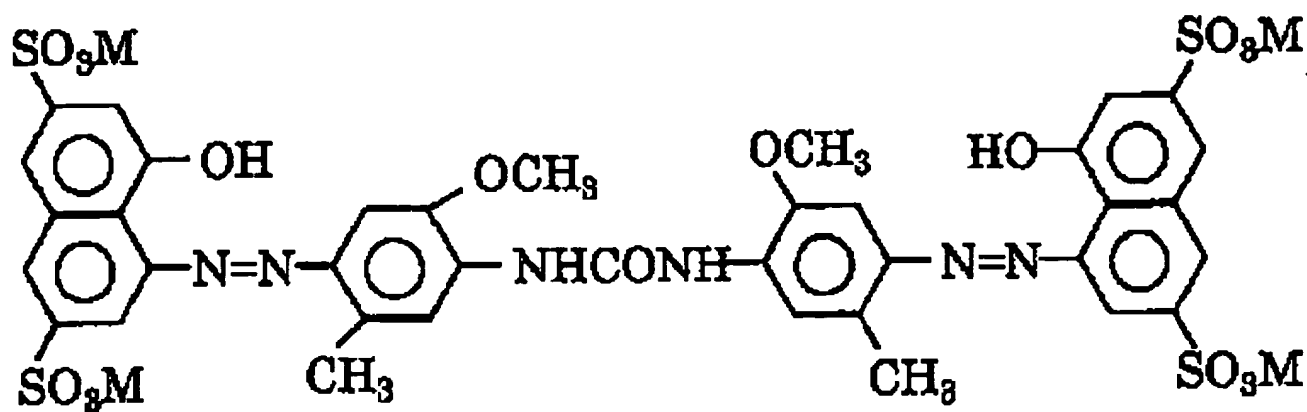
[0070] As dichroism coloring matter, the anthraquinone system coloring matter which includes condensed systems, such as azo system coloring matter, cyanine system coloring matter, and indan SURON, for example, stilbene system coloring matter, pyrazolone system coloring matter, perylene system coloring matter, North America Free Trade Agreement RUMIDO system coloring matter, triphenylmethane color system coloring matter, quinoline system coloring matter, oxazine system coloring matter, thiazin system coloring matter, kino FUTARON system coloring matter, indigo system coloring matter, thioindigo system coloring matter, etc. are mentioned. It is not this limitation although water-soluble coloring matter is desirable. As an example of dichroism coloring matter For example, C.I.Direct Blue 1 and C.I.DirectBlue 15 C.I.Direct Blue 67 C.I.Direct Blue 78 C.I.Direct Blue 83 and C.I.Direct Blue 90 C.I.Direct Blue 98 C.I.Direct Blue 151 C.I.Direct Blue 168 C.I.Direct Blue 202 C.I.Direct Green 51 C.I.Direct Green 59 C.I.Direct Green 85 C.I.Direct Violet 9 C.I.Direct Violet 48 C.I.Direct Red 2 C.I.Direct Red 39 C.I.Direct Red 79 C.I.DirectRed 81, C.I.Direct Red 83, C.I.Direct Red 89, C.I.Direct Orange 39 and C.I.Direct Orange 41 C.I.Direct Orange 49 C.I.DirectOrange 72 C.I.DirectYellow 12 C.I.Direct Yellow 26 C.I.Direct Yellow 44 C.I.Direct Yellow 50 C.I.Acid Red 37, C.I.No.27865 C. I.No.27915 and C.I.No.27920, C.I.No.29058 C.I.No.29060 disufoindanthrone disulfo-N and N'-dixylylperylene-tetracarbo-di-imide etc. is mentioned. Next, it is indicated below that it is also with a structure expression about some examples.

[0071]

[Formula 16]

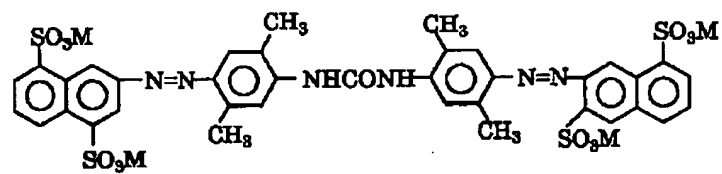
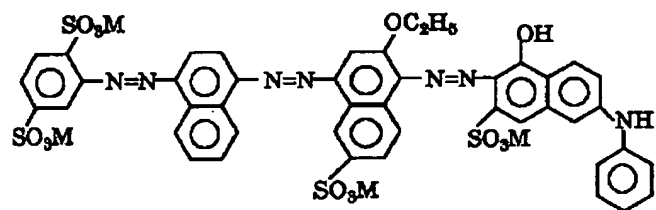
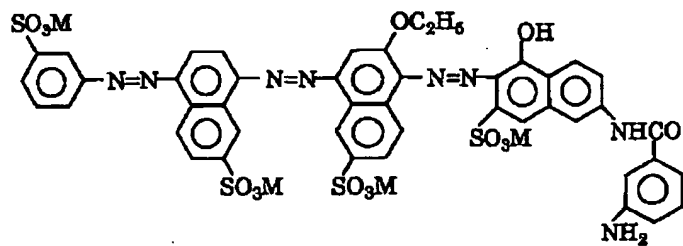
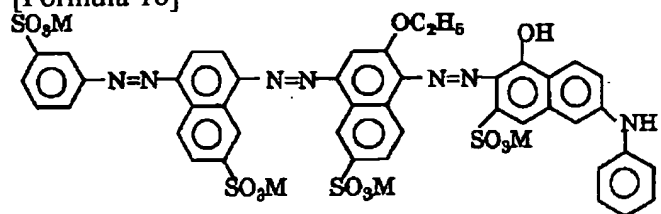


[0072]
[Formula 17]



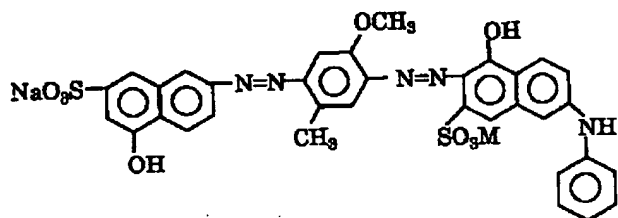
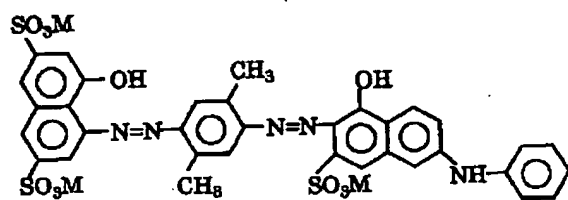
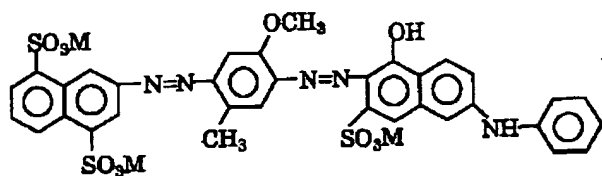
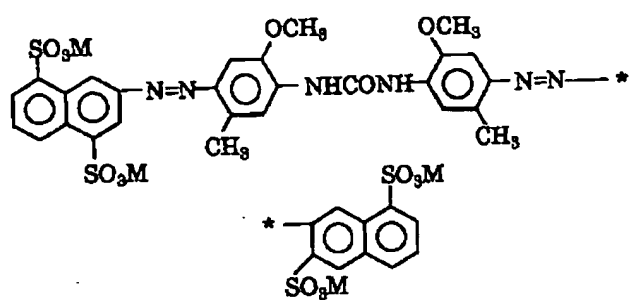
[0073]

[Formula 18]



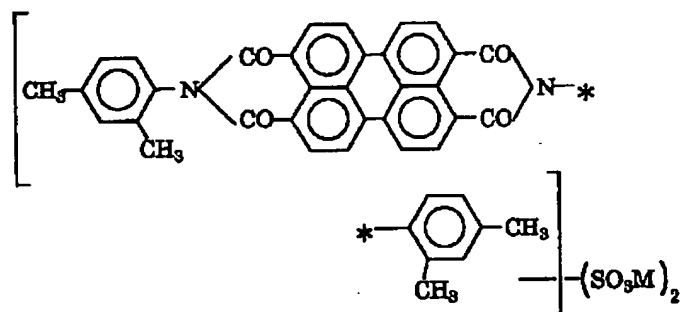
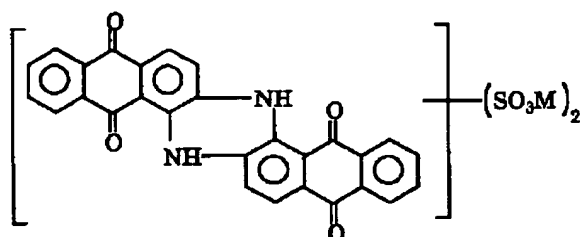
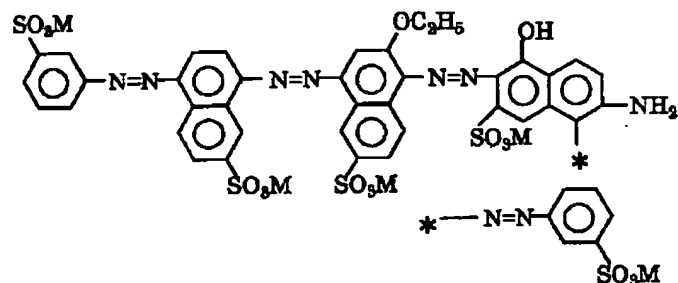
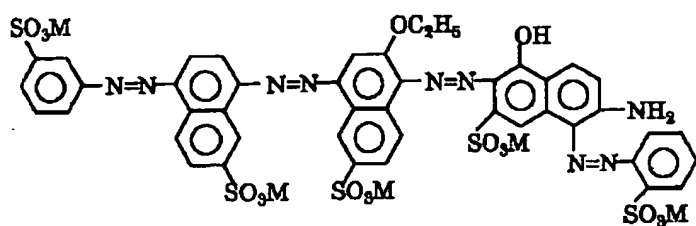
[0074]

[Formula 19]



[0075]

[Formula 20]



[0076]

[Example] Although an example explains this invention concretely below, this invention is not limited to these examples. Among an example, especially the section expresses the weight section, unless it limits. Moreover, % means weight %, as long as there is no notice.

[0077] Production of an example 1 light active group content polyamide thin film and the linearly polarized light exposure following polyamide compound (1) refined-material 2 section are dissolved in the NMP98 section, and a polymer solution is produced 2%. Next, on a glass substrate, a spin coat is carried out so that it may become about 0.6 to 0.7 micrometer desiccation thickness, stoving is carried out at 100 degrees C for 2 hours, and this polyamide thin film is formed. After considering as the light with 500nm cut-off filter using an extra-high pressure mercury lamp (500 W/hr) and considering as the linearly polarized light through a polarizing plate further, it irradiates for 1 minute from the distance of 50cm on the film surface of the glass substrate in which this polyamide

thin film was formed, and the molecule shaft of the optical active group of a polarization exposure part is made to arrange in the fixed direction. Subsequently, the linearly polarized light which has a different polarization shaft through a stripe-like mask is irradiated similarly, and the molecule shaft of an optical active group is made to arrange in the different direction partially.

[0078] The heating dissolution of the production C.I. Direct Blue 67 5 section of the meeting nature dichroism coloring matter film and the emulgen 108 (nonionic surface active agent: Kao Corp. make) 0.2 section is carried out at the deionized water 94.8 section, and a coloring matter solution is prepared. This coloring matter solution was used on the film surface of the above-mentioned polyamide thin film substrate, and the roll coater for sheet substrates was applied. The roll coater tuned the location between a coating roll and a substrate finely beforehand, was pushed between the roll and the substrate, and adjusted ** to 0.3MPa(s). Measurement of a pressure was measured by the Fuji film press kale. It dried under the condition of 30 degrees C and 60%RH, and the applied substrate obtained the polarizing element of the shape of a stripe of this invention. The visible absorption spectrum is shown in drawing 1. The dichroism ratio in absorption-maximum wavelength was 25.

[0079] They are the 5-(4'-dimethylaminophenylazo) isophthalic acid 3.1 section, 4, and 4'-diamino in the synthetic NMP50 section of a polyamide compound (1). - 3, 5, 3', and the 5'-tetraethyl diphenylmethane (TEDPM: Nippon Kayaku Co., Ltd. make) 3.1 section are added, and the stirring dissolution is carried out. Subsequently, the triphenyl FOSU fight 9.3 section and the pyridine 2.4 section are added, and a stirring reaction is carried out at 100 degrees C for 10 hours. The after [reaction termination] water 50 section is added, and except for a supernatant, the sodium carbonate water-solution 100 section is added 2%, and it stirs overnight, and is made to crystallize by the decantation. the generated crystal is filtered, rinsing desiccation is carried out, and the polyamide compound (1) {Pori -- IMINO 5-[4-(dimethylamino) phenylazo] iso phtalo IRUI minnow 1, 4-(3, 5-diethyl) phenylene methylene 1, and 4-(3, 5-diethyl) phenylene} 5.9 section is obtained. The heating dissolution is carried out at little NMP, and reprecipitation purification is diluted and carried out with a methanol.

[0080] The 5-amino isophthalic acid 9.05 section and the 6-N hydrochloric-acid 17 section are added into the synthetic iced water 100 section of 5-(4'-dimethylaminophenylazo) isophthalic acid used as a raw material of a polyamide compound (1), and it cools by iced water. The sodium nitrite 3.45 section is dissolved in the water 10 section, and it adds and diazotizes below 5 degrees C. Independently, the coupling solution of the N and N-dimethylaniline 6.3 section, the 6-N hydrochloric-acid 8.5 section, and the iced water 60 section is prepared, and it cools by iced water. It stirs below 10 degrees C all night, adding the above-mentioned diazonium solution below 5 degrees C, adding a sodium carbonate solution 2%, and maintaining pH 4-6 into this coupling solution. The depositing crystal is filtered, rinsing desiccation is carried out, and the monoazo coloring matter 5-(4'-dimethylaminophenylazo) isophthalic acid 15.5 section is obtained.

[0081] Production of an example 2 light active group content polyamide thin film and the linearly polarized light exposure following polyamide compound (2) refined-material 2 section are dissolved in the NMP98 section, and a polymer solution is produced 2%. The linearly polarized light is irradiated for 1 minute from the distance of 50cm on the film

surface of the glass substrate which formed this polyamide thin film according to the example 1, and formed this polyamide thin film, and the molecule shaft of the optical active group of a polarization exposure part is made to arrange in the fixed direction. Subsequently, the linearly polarized light which has a different polarization shaft through a stripe-like mask is irradiated similarly, and the molecule shaft of an optical active group is made to arrange in the different direction partially.

[0082] The heating dissolution of the production 1C.I.Direct Blue 67 5 section of the meeting nature dichroism coloring matter film and the EMARU 20C(anionic surface active agent: Kao Corp. make) 0.2 section is carried out at the deionized water 94.8 section, and a coloring matter solution is prepared. This coloring matter solution was used on the film surface of the above-mentioned polyamide thin film substrate, and the roll coater for sheet substrates was applied. The roll coater tuned the location between a coating roll and a substrate finely beforehand, was pushed between the roll and the substrate, and adjusted ** to 0.2MPa(s). Measurement of a pressure was measured by the Fuji film press kale. It dried under the condition of 30 degrees C and 60%RH, and the applied substrate obtained the polarizing element of the shape of a stripe of this invention.

[0083] The heating dissolution of the one section and the emulgen 108 (nonionic surface active agent: Kao Corp. make) 0.2 section is carried out for production 2Benzopurpurine 4B of the meeting nature dichroism coloring matter film at the deionized water 98.8 section, and a coloring matter solution is prepared. This coloring matter solution was used on the film surface of the above-mentioned polyamide thin film substrate, and the roll coater for sheet substrates was applied. The roll coater tuned the location between a coating roll and a substrate finely beforehand, was pushed between the roll and the substrate, and adjusted ** to 0.2MPa(s). Measurement of a pressure was measured by the Fuji film press kale. It dried under the condition of 30 degrees C and 60%RH, and the applied substrate obtained the polarizing element of the shape of a stripe of this invention. The visible absorption spectrum is shown in drawing 2 . The dichroism ratio in absorption-maximum wavelength was 30.

[0084] They are the 5-(4'-(4"-dimethylaminophenylazo) phenoxy undecanone yloxy) isophthalic acid 5.9 section, 4, and 4'-diamino in the synthetic NMP50 section of a polyamide compound (2). - 3, 5, 3', and the 5'-tetraethyl diphenylmethane (TEDPM) 3.1 section are added, and the stirring dissolution is carried out. Subsequently, the triphenyl FOSU fight 9.3 section and the pyridine 2.4 section are added, and a stirring reaction is carried out at 100 degrees C for 10 hours. The after [reaction termination] water 30 section is added, and except for a supernatant, the sodium carbonate water-solution 100 section is added 2%, and it stirs overnight, and is made to crystallize by the decantation. the generated crystal is filtered, rinsing desiccation is carried out, and the polyamide compound (2) {Pori -- IMINO 5-[(4'-dimethylaminophenylazo) phenoxy undecanone ROKISHI] iso phtalo IRUI minnow 1, 4-(3, 5-diethyl) phenylene methylene 1, and 4-(3, 5-dimethyl) phenylene} 8.7 section is obtained. The heating dissolution is carried out at little NMP, and reprecipitation purification is diluted and carried out with a methanol.

[0085] The stirring reaction of the synthetic 4-oxy-(4'-dimethylaminophenylazo) benzene of 5-(4'-(4"-dimethylaminophenylazo) phenoxy undecanone yloxy) isophthalic acid used as a raw material of a polyamide compound (2), the 4-(4'-dimethylaminophenylazo) phenoxy undecanoic acid 8.5 section compounded from 11-BUROMO undecanoic acid,

and the thionyl chloride 9.6 section is carried out at a room temperature in the toluene 30 section for 5 hours. The DMF20 section which dissolved the 5-oxy-isophthalic acid JITETORA pyranil ester 7.5 section and the pyridine 9.6 section is dropped distilling off a superfluous thionyl chloride and cooling by iced water under reduced pressure, after that. A stirring reaction is carried out at five to 10 degree C for 15 hours. It dilutes with the sodium carbonate water-solution 500 section after [reaction termination] 2%, and the toluene 100 section is added and liquids are separated. A toluene layer is rinsed, reduced pressure distilling off of the toluene after desiccation is carried out with sulfuric anhydride soda, and oil is obtained. This is dissolved in the dioxane 100 section, the concentrated-hydrochloric-acid 10 section is added, a stirring reaction is carried out, and an ester group is hydrolyzed. The crystal which neutralized in the sodium carbonate water solution 5%, and deposited is filtered, rinsing desiccation is carried out, and the crude material of 5-(4'-(4"-dimethylaminophenylazo) phenoxy undecanone yloxy) isophthalic acid is obtained. It recrystallizes in alcohol and a refined material is obtained.

[0086] The polyamide compound (2) refined-material 2 section obtained in production of an example 3 light active group content polyamide thin film and the linearly polarized light exposure example 2 is dissolved in the NMP98 section, and a polymer solution is produced 2%. The linearly polarized light is irradiated for 1 minute from the distance of 50cm on the film surface of the glass substrate which formed this polyamide thin film according to the example 1, and formed this polyamide thin film, and the molecule shaft of the optical active group of a polarization exposure part is made to arrange in the fixed direction. Subsequently, the linearly polarized light which has a different polarization shaft through a stripe-like mask is irradiated similarly, and the molecule shaft of an optical active group is made to arrange in the different direction partially.

[0087] The heating dissolution of the production C.I.Direct Blue 67 10 section of the meeting nature dichroism coloring matter film and the EMARU NC(anionic surface active agent: Kao Corp. make) 0.2 section is carried out at the deionized water 89.8 section, and a coloring matter solution is prepared. This coloring matter solution was used on the film surface of the above-mentioned polyamide thin film substrate, and the roll coater for sheet substrates was applied. The roll coater tuned the location between a coating roll and a substrate finely beforehand, was pushed between the roll and the substrate, and adjusted ** to 0.5MPa(s). Measurement of a pressure was measured by the Fuji film press kale. It dried under the condition of 30 degrees C and 60%RH, and the applied substrate obtained the polarizing element of the shape of a stripe of this invention.

[0088] The stirring reaction of the special composition approach 4-(4'-dimethylaminophenylazo) phenoxy undecanoic acid 8.5 section of a polyamide compound (2) and the thionyl chloride 9.6 section is carried out at a room temperature in the toluene 30 section for 5 hours. It is Pori (imino-5-OKISHI iso phthloyl imino - [1, 4-(3, 5-diethyl) phenylene methylene -1 and the liquid that dissolved the 4-(3, 5-diethyl) phenylene 4.6 section and the pyridine 9.6 section in the NMP100 section are dropped.]), distilling off a superfluous thionyl chloride and cooling by iced water under reduced pressure, after that. A stirring reaction is carried out at five to 10 degree C for 15 hours. It dilutes with the sodium carbonate water-solution 500 section after [reaction termination] 2%, and the crystal which deposited after distilling off toluene is filtered and rinsing desiccation is carried out. The heating dissolution of the crude polyamide is carried out at

little NMP, and reprecipitation purification is diluted and carried out with a methanol. It was clear from NMR measurement that this thing's about 50% of oxy-radical is permuted by 4-(4'-dimethylaminophenylazo) phenoxy undeca noil radical.

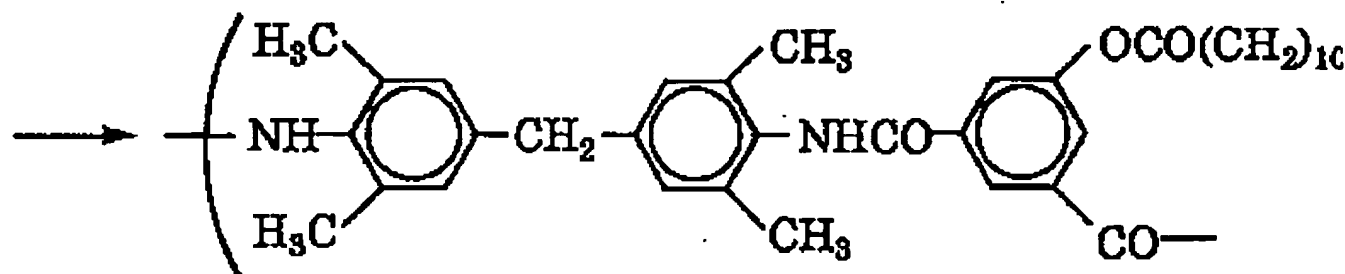
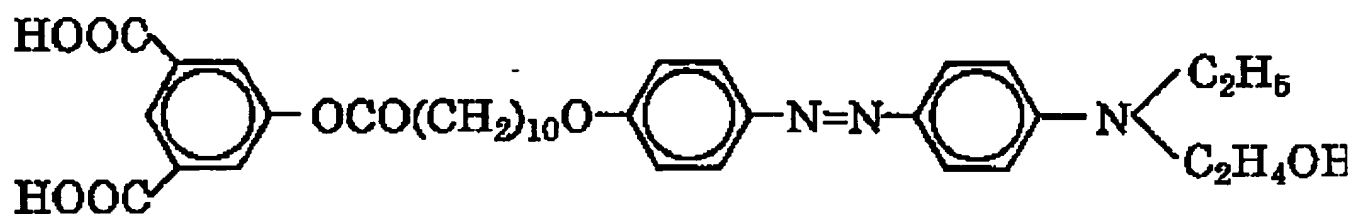
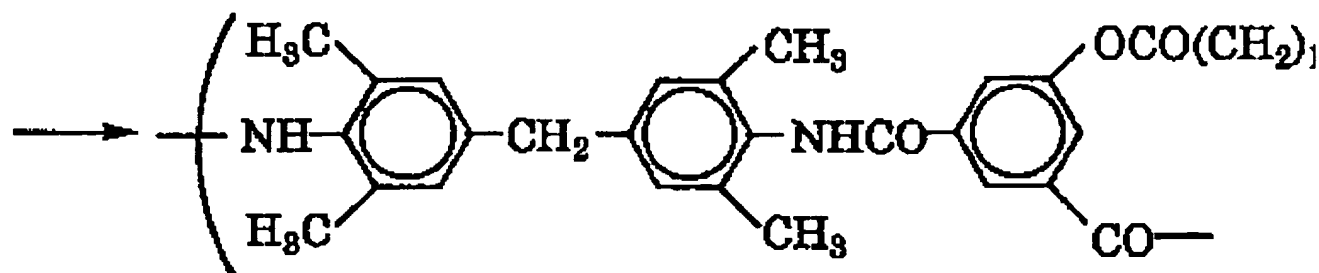
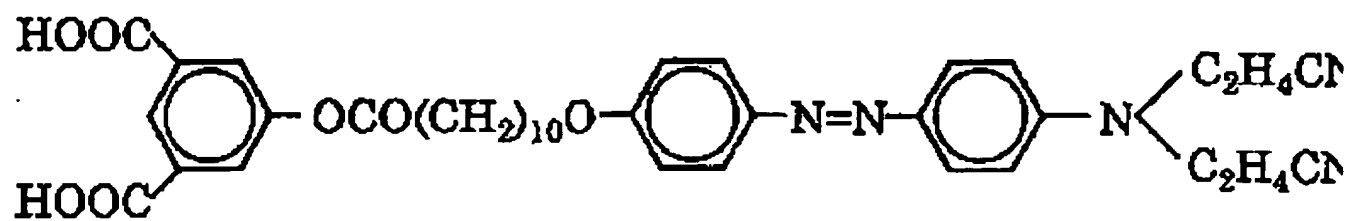
[0089] The heating dissolution of the special composition approach 4-(4'-dimethylaminophenylazo) phenoxy undecanoic acid 8.5 section of an example 4 polyamide compound (2) is carried out into the dimethylformamide 200 section, and it cools at 20 degrees C. The Pori (imino-5-OKISHI iso phthloyl imino - 1, 4-(3, 5-diethyl) phenylene methylene -1, 4-(3, 5-diethyl) phenylene) 9.1 section is added to this, and it dissolves in it. Furthermore, 2-chloro -1, the 3-dimethyl imidazolium chloride 3.4 section, and the pyridine 3.4 section are added, and a stirring reaction is carried out at 20 to 22 degree C for 20 hours. A little non-melt is filtered after reaction termination. Filtrate is diluted with the sodium carbonate water-solution 500 section 2%, the crude polyamide which deposited is filtered, and rinsing desiccation is carried out. The heating dissolution of the crude polyamide is carried out at little NMP, and reprecipitation purification is diluted and carried out with a methanol. It was clear from NMR measurement that this thing's about 90% of oxy-radical is permuted by 4-(4'-dimethylaminophenylazo) phenoxy undeca noil radical.

[0090] The polyamide compound (2) refined-material 2 section obtained by production of an optical active group content polyamide thin film and the linearly polarized light exposure above-mentioned composition approach is dissolved in the NMP98 section, and a polymer solution is produced 2%. The linearly polarized light is irradiated for 1 minute from the distance of 50cm on the film surface of the glass substrate which formed this polyamide thin film according to the example 1, and formed this polyamide thin film, and the molecule shaft of the optical active group of a polarization exposure part is made to arrange in the fixed direction. Subsequently, the linearly polarized light which has a different polarization shaft through a stripe-like mask is irradiated similarly, and the molecule shaft of an optical active group is made to arrange in the different direction partially.

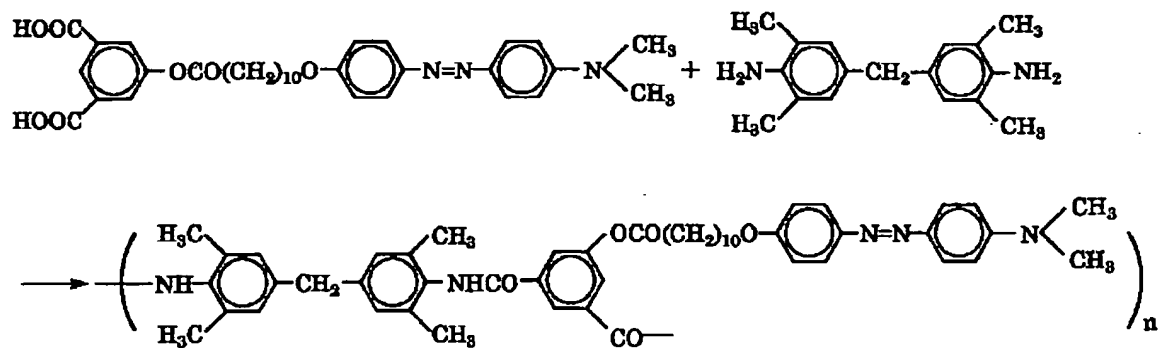
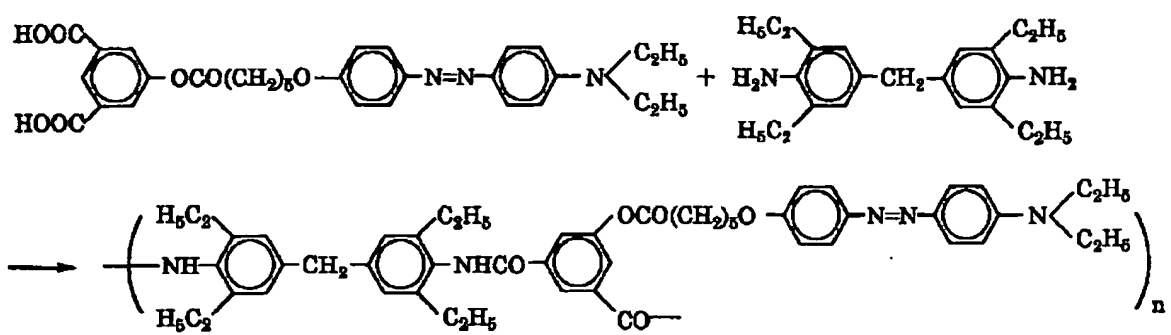
[0091] The heating dissolution of the three sections and the emulgen 108 (nonionic surface active agent: Kao Corp. make) 0.2 section is carried out for production C.I.Direct Blue 67 of the meeting nature dichroism coloring matter film at the deionized water 96.8 section, and a coloring matter solution is prepared. This coloring matter solution was used on the film surface of the above-mentioned polyamide thin film substrate, and the roll coater was applied. The roll coater tuned the location between a coating roll and a substrate finely beforehand, was pushed between the roll and the substrate, and adjusted ** to 0.2MPa(s). Measurement of a pressure was measured by the Fuji film press kale. It dried under the condition of 30 degrees C and 60%RH, and the applied substrate obtained the polarizing element of the shape of a stripe of this invention.

[0092] The polyamide compound shown in Table 1 like an example 4 is obtained, and the same optical orientation effect is acquired also about them.

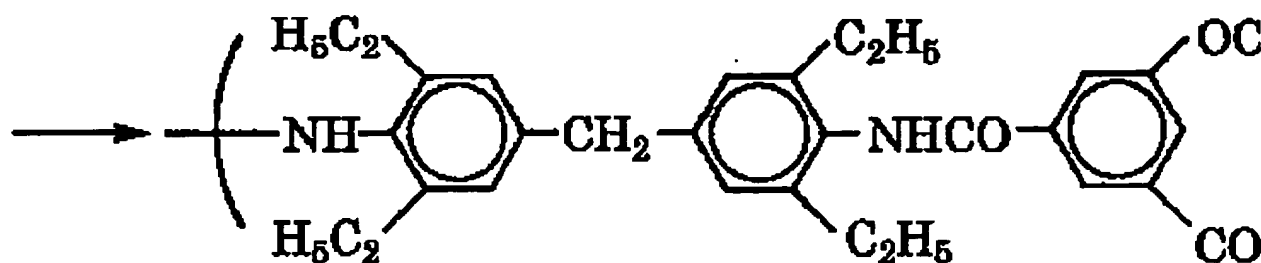
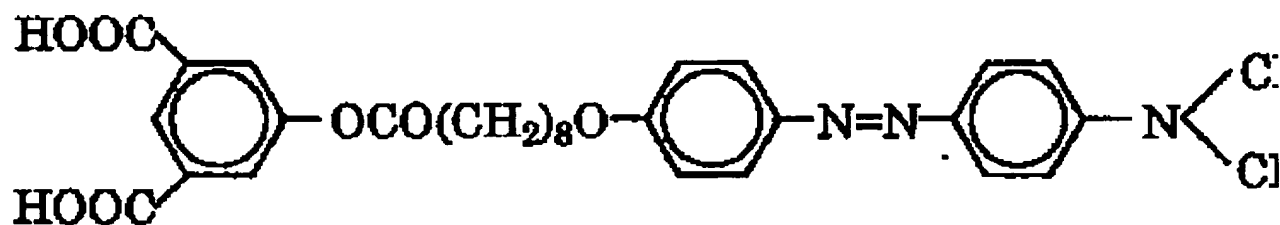
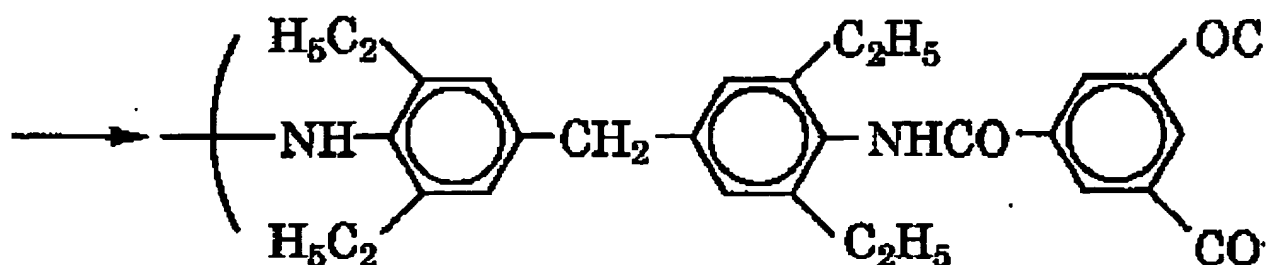
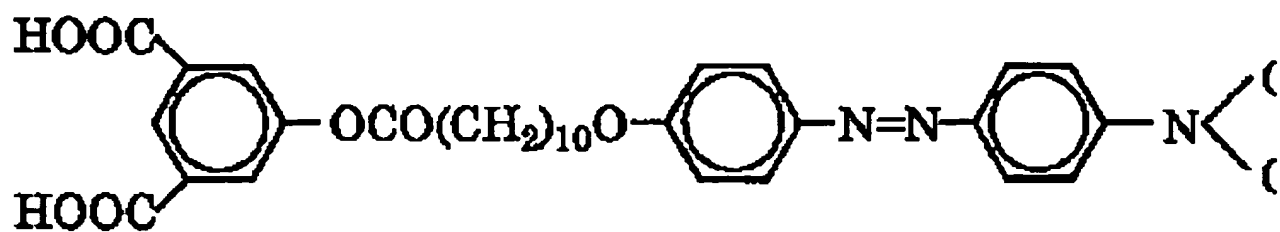
Table 1 [0093]



[0094]



[0095]



[0096] Production of an example 5 light active group content polyamide thin film and the linearly polarized light exposure following polyamide compound (3) refined-material 2 section are dissolved in the NMP98 section, and a polymer solution is produced 2%. Next, on a glass substrate, a spin coat is carried out so that it may become about 0.6 to 0.7 micrometer desiccation thickness, stoving is carried out for 10 minutes at 180 degrees C, and this polyamide thin film is formed. After considering as the light with 550nm cut-off

filter using an extra-high pressure mercury lamp (500 W/hr) and considering as the linearly polarized light through a polarizing plate further, it irradiates for 1 minute from the distance of 50cm on the film surface of the glass substrate in which this polyamide thin film was formed, and the molecule shaft of the optical active group of a polarization exposure part is made to arrange in the fixed direction. Subsequently, the linearly polarized light which has a different polarization shaft through a stripe-like mask is irradiated similarly, and the molecule shaft of an optical active group is made to arrange in the different direction partially.

[0097] The heating dissolution of the production C.I. Direct Blue 67 3 section of the meeting nature dichroism coloring matter film and the emulgen 108 (nonionic surface active agent: Kao Corp. make) 0.2 section is carried out at the deionized water 96.8 section, and a coloring matter solution is prepared. This coloring matter solution was used on the film surface of the above-mentioned polyamide thin film substrate, and the roll coater was applied. The roll coater tuned the location between a coating roll and a substrate finely beforehand, was pushed between the roll and the substrate, and adjusted ** to 0.2MPa(s). Measurement of a pressure was measured by the Fuji film press kale. It dried under the condition of 30 degrees C and 60%RH, and the applied substrate obtained the polarizing element of the shape of a stripe of this invention.

[0098] They are the 5-(4'-dimethylamino naphthylazo) isophthalic acid 3.5 section, 4, and 4'-diamino in the synthetic NMP50 section of a polyamide compound (3). - 3, 5, 3', and the 5'-tetraethyl diphenylmethane (TEDPM) 3.1 section are added, and the stirring dissolution is carried out. Subsequently, the triphenyl FOSU fight 9.3 section and the pyridine 2.4 section are added, and a stirring reaction is carried out at 100 degrees C for 10 hours. The after [reaction termination] water 50 section is added, and except for a supernatant, the sodium carbonate water-solution 100 section is added 2%, and it stirs overnight, and is made to crystallize by the decantation. the generated crystal is filtered, rinsing desiccation is carried out, and the polyamide compound (3) {Pori -- IMINO 5-[4-(dimethylamino) naphthylazo] iso phtalo IRUI minnow 1, 4-(3, 5-diethyl) phenylene methylene 1, and 4-(3, 5-diethyl) phenylene} 3.5 section is obtained. The heating dissolution is carried out at little NMP, and reprecipitation purification is diluted and carried out with a methanol.

[0099] The 5-amino isophthalic acid 9.05 section and the 6-N hydrochloric-acid 17 section are added into the synthetic iced water 100 section of 5-(4'-dimethylamino naphthylazo) isophthalic acid used as a raw material of the above-mentioned polyamide compound (3), and it cools by iced water. The sodium nitrite 3.45 section is dissolved in the water 10 section, and it adds and diazotizes below 5 degrees C. Independently, the coupling solution of the 1-N and N-dimethyl naphthylamine 8.9 section, the 6-N hydrochloric-acid 8.5 section, and the iced water 60 section is prepared, and it cools by iced water. It stirs below 10 degrees C all night, adding the above-mentioned diazonium solution below 5 degrees C, adding a sodium carbonate solution 2%, and maintaining pH 4-6 into this coupling solution. The depositing crystal is filtered, rinsing desiccation is carried out, and the monoazo coloring matter 5-(4'-dimethylamino naphthylazo) isophthalic acid 15.8 section is obtained.

[0100] Production of an example 6 light active group content polyamide thin film and the linearly polarized light exposure following polyamide compound (4) refined-material 2 section are dissolved in the NMP98 section, and a polymer solution is produced 2%.

After forming this polyamide thin film according to an example 1, considering as the light with 500nm cut-off filter using an extra-high pressure mercury lamp (500 W/hr) and considering as the linearly polarized light through a polarizing plate further, it irradiates for 1 minute from the distance of 50cm on the film surface of the glass substrate in which this polyamide thin film was formed, and the molecule shaft of the optical active group of a polarization exposure part is made to arrange in the fixed direction. Subsequently, the linearly polarized light which has a different polarization shaft through a stripe-like mask is irradiated similarly, and the molecule shaft of an optical active group is made to arrange in the different direction partially.

[0101] The heating dissolution of the one section and the emulgen 108 (nonionic surface active agent: Kao Corp. make) 0.2 section is carried out for production Benzopurpurine 4B of the meeting nature dichroism coloring matter film at the deionized water 98.8 section, and a coloring matter solution is prepared. This coloring matter solution was used on the film surface of the above-mentioned polyamide thin film substrate, and the roll coater for sheet substrates was applied. The roll coater tuned the location between a coating roll and a substrate finely beforehand, was pushed between the roll and the substrate, and adjusted ** to 0.2MPa(s). Measurement of a pressure was measured by the Fuji film press kale. It dried under the condition of 30 degrees C and 60%RH, and the applied substrate obtained the polarizing element of the shape of a stripe of this invention.

[0102] They are the 5-(4'-methoxy naphthylazo) isophthalic acid 3.5 section, 4, and 4'-diamino in the synthetic NMP50 section of a polyamide compound (4). - 3, 5, 3', and the 5'-tetraethyl diphenylmethane (TEDPM) 3.1 section are added, and the stirring dissolution is carried out. Subsequently, the triphenyl FOSU fight 9.3 section and the pyridine 2.4 section are added, and a stirring reaction is carried out at 100 degrees C for 10 hours. The after [reaction termination] water 50 section is added, and except for a supernatant, the sodium carbonate water-solution 100 section is added 2%, and it stirs overnight, and is made to crystallize by the decantation. The generated crystal is filtered, rinsing desiccation is carried out, and the polyamide compound (4) (Pori [IMINO 5-(4-dimethoxy naphthylazo) iso phtalo IRUI minnow 1, 4-(3, 5-diethyl) phenylene methylene 1, 4-(3, 5-diethyl) phenylene]) 3.5 section is obtained. The heating dissolution is carried out at little NMP, and reprecipitation purification is diluted and carried out with a methanol.

[0103] The 5-amino isophthalic acid diethyl ester 12.6 section and the 6-N hydrochloric-acid 18 section are added into the synthetic water 40 section of 5-(4'-methoxy naphthylazo) isophthalic acid used as a raw material of the above-mentioned polyamide compound (4), and it cools by iced water. The sodium nitrite 3.67 section is dissolved in the water 10 section, and it adds and diazotizes below 5 degrees C. Independently, the coupling solution of the 1-naphthol 7.7 section, the sodium carbonate 6.5 section, and the water 60 section is prepared, and it cools by iced water. The above-mentioned diazonium solution is added below 5 degrees C in this coupling solution, and it stirs below 10 degrees C all night. Subsequently, the 6-N hydrochloric-acid 12 section is added and filtered, rinsing desiccation is carried out, and the monoazo coloring matter 5-(4'-oxy-naphthylazo) isophthalic acid diethyl ester 20.7 section is obtained. Next, the monoazo coloring matter 12.5 above-mentioned section, the sodium carbonate 2.9 section, and the toluenesulfonic acid methyl 10.0 section are taught into the DMF60 section, and a stirring

reaction is carried out at 100 degrees C for 10 hours. The after [a reaction] water 120 section is added and it stirs all night. The depositing crystal is filtered and rinsed. Furthermore, this wet cake is prepared into the solution which dissolved the caustic-alkali-of-sodium 3.3 section into the methanol 70 section, and a stirring reaction is carried out at 55 to 65 degree C for 4 hours. It checks adding and carrying out the full dissolution of the after [a reaction] water 200 section, filtration rinsing desiccation of the crystal which adds 6-N hydrochloric acid, neutralizes and deposits is carried out, and the 5-(4'-methoxy naphthylazo) isophthalic acid 5.6 section is obtained.

[0104] The stirring dissolution is carried out teaching composition of example 7 polyimide (1) and the preparation 4-dimethylamino-4'-II (amino) ethylamino phenylazobenzene 3.26 section of a thin film, and the N-methyl-2-pyrrolidone 60 section to a 4 opening flask, and blowing the bottom nitrogen of water cooling. Subsequently, cyclopentane - The 1, 2, 3, and 4-tetracarboxylic acid anhydride 2.1 section is added small quantity every. It is made to react at 60 degrees C for 10 hours, and a polyamic acid solution is obtained for bottom 4 hours of after [addition termination] water cooling. The N-methyl-2-pyrrolidone 40 section is added to this, a polyamic acid solution is adjusted 5%, a spin coat is carried out so that it may become about 0.6 to 0.7 micrometer desiccation thickness on a glass substrate, and it heats at 200 degrees C for 1 hour, and this polyimide thin film is obtained. After considering as the light with 550nm cut-off filter using an extra-high pressure mercury lamp (500 W/hr) and considering as the linearly polarized light through a polarizing plate further, it irradiates for 1 minute from the distance of 50cm on the film surface of the glass substrate which formed this polyimide thin film through the stripe-like mask, and the molecule shaft of the optical active group of a polarization exposure part is made to arrange in the fixed direction. Subsequently, the linearly polarized light which has a different polarization shaft through a stripe-like mask is irradiated similarly, and the molecule shaft of an optical active group is made to arrange in the different direction partially.

[0105] The heating dissolution of the production C.I.Direct Blue 67 1 section of the meeting nature dichroism coloring matter film and the emulgen 108 (nonionic surface active agent: Kao Corp. make) 0.02 section is carried out at the deionized water 8.98 section, and a coloring matter solution is adjusted. This coloring matter solution was used on the film surface of the above-mentioned polyimide thin film substrate, and the roll coater was applied. The roll coater tuned the location between a coating roll and a substrate finely beforehand, was pushed between the roll and the substrate, and adjusted ** to 0.2MPa(s). Measurement of a pressure was measured by the Fuji film press kale. It dried under the condition of 30 degrees C and 60%RH, and the applied substrate obtained the polarizing element of the shape of a stripe of this invention.

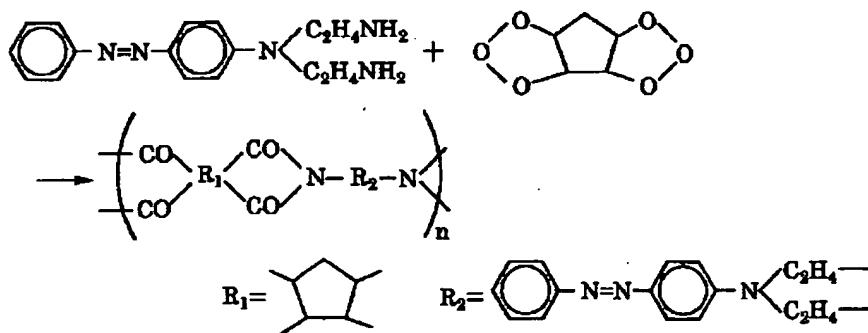
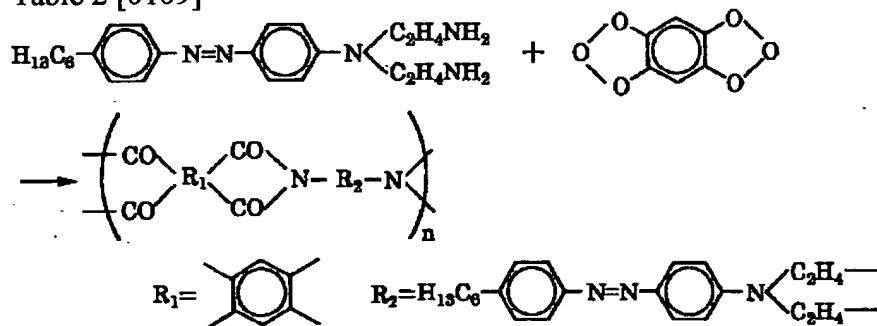
[0106] The stirring dissolution is carried out teaching composition of example 8 polyimide (2) and the preparation N of a thin film, the N-diamino ethyl-4-(4'-(4"-dimethylaminophenylazo) phenoxy) undecanone yloxy aniline 3.01 section, and the N-methyl-2-pyrrolidone 60 section to a 4 opening flask, and blowing the bottom nitrogen of water cooling. Subsequently, the 4 and 4'-oxy-JIFUTARU acid-anhydride 1.55 section is added small quantity every. It is made to react at 60 degrees C for 10 hours, and a polyamic acid solution is obtained for bottom 4 hours of after [addition termination] water cooling. The N-methyl-2-pyrrolidone 30 section is added to this, a polyamic acid solution is adjusted 5%, a spin coat is carried out so that it may become about 0.6 to 0.7

micrometer desiccation thickness on a glass substrate, and it heats at 200 degrees C for 1 hour, and this polyimide thin film is obtained. After considering as the light with 550nm cut-off filter using an extra-high pressure mercury lamp (500 W/hr) and considering as the linearly polarized light through a polarizing plate further, it irradiates for 1 minute from the distance of 50cm on the film surface of the glass substrate which formed this polyimide thin film through the stripe-like mask, and the molecule shaft of the optical active group of a polarization exposure part is made to arrange in the fixed direction. Subsequently, the linearly polarized light which has a different polarization shaft through a stripe-like mask is irradiated similarly, and the molecule shaft of an optical active group is made to arrange in the different direction partially.

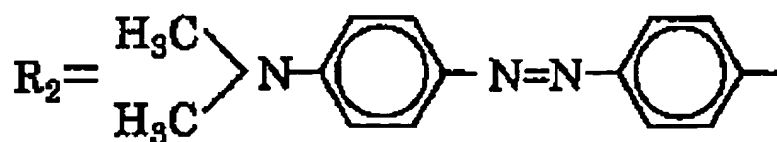
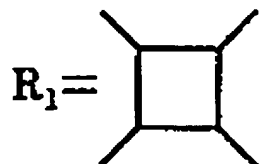
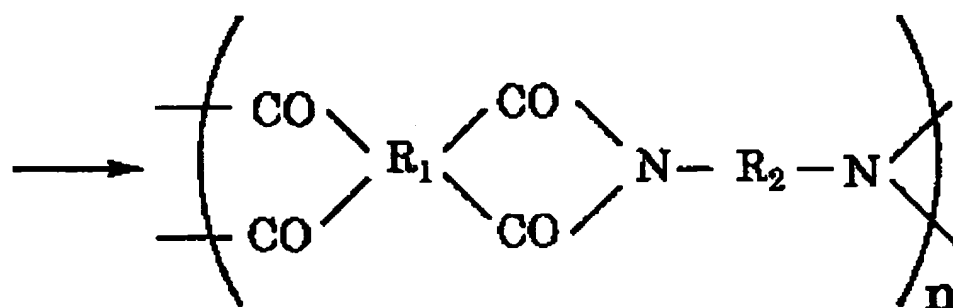
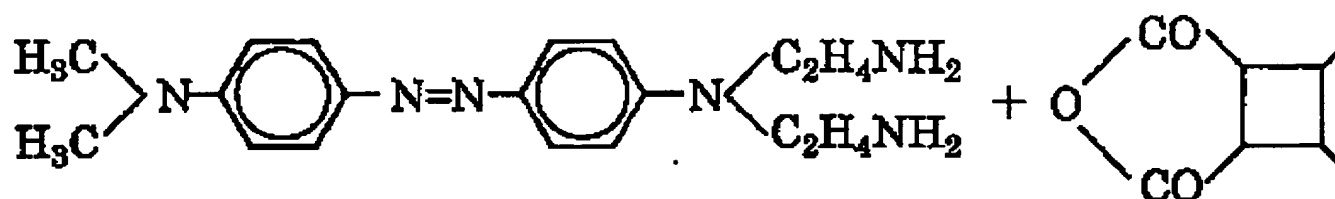
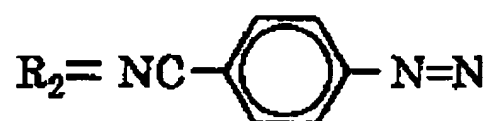
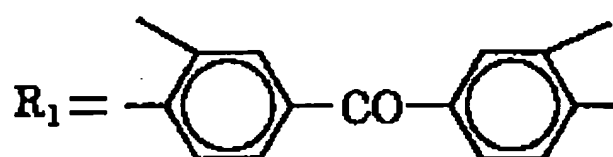
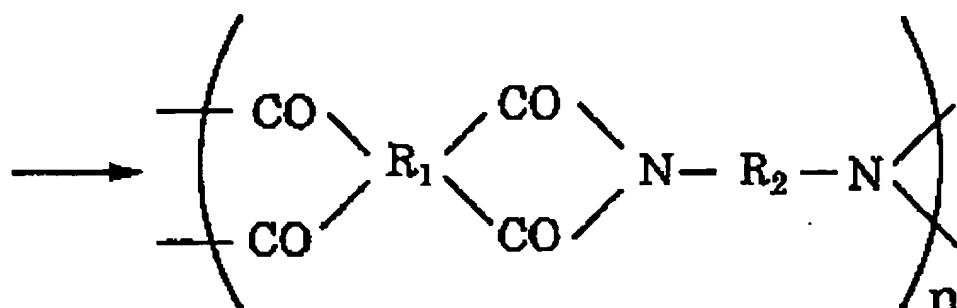
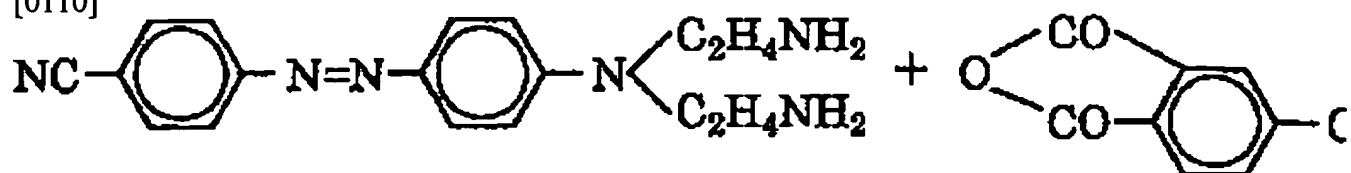
[0107] The heating dissolution of the production C.I. Direct Blue 67 1 section of the meeting nature dichroism coloring matter film and the emulgen 108 (nonionic surface active agent: Kao Corp. make) 0.02 section is carried out at the deionized water 8.98 section, and a coloring matter solution is adjusted. This coloring matter solution was used on the film surface of the above-mentioned polyimide thin film substrate, and the roll coater was applied. The roll coater tuned the location between a coating roll and a substrate finely beforehand, was pushed between the roll and the substrate, and adjusted ** to 0.2MPa(s). Measurement of a pressure was measured by the Fuji film press kale. It dried under the condition of 30 degrees C and 60%RH, and the applied substrate obtained the polarizing element of the shape of a stripe of this invention.

[0108] Following diamine and a following tetracarboxylic acid anhydride can be made to be able to react according to the synthetic example examples 7 and 8 of other polyimide, and the polyimide shown in Table 2 can be obtained. An optical orientation effect with the same said of them is acquired.

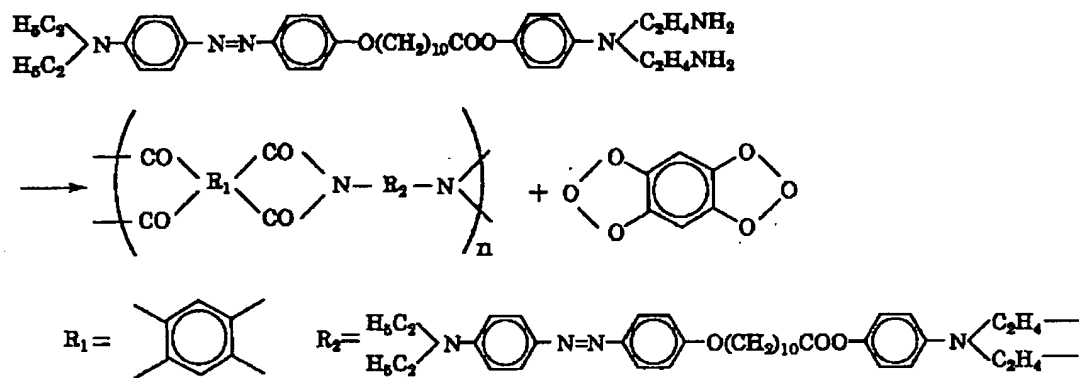
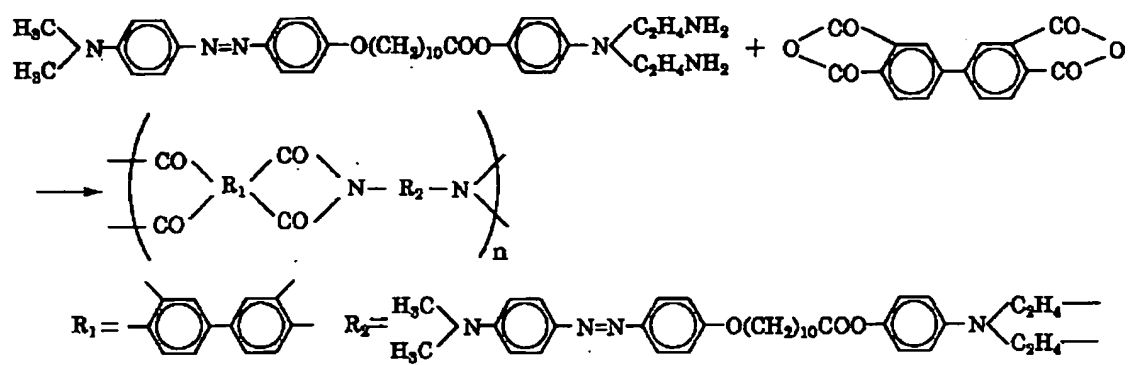
Table 2 [0109]



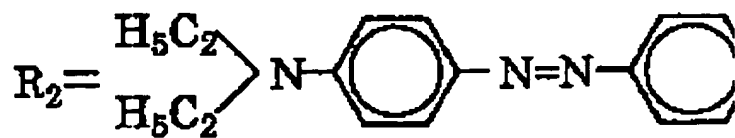
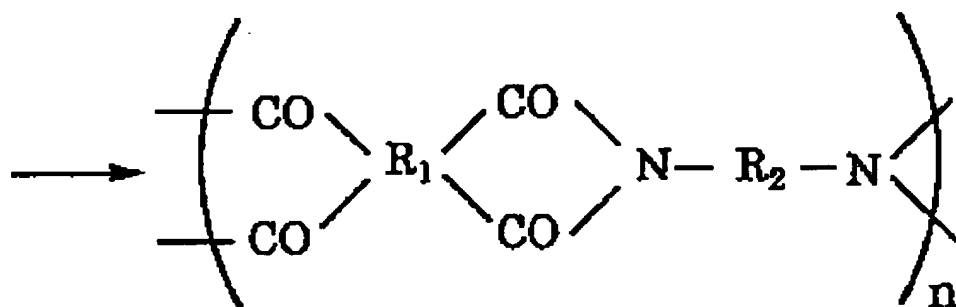
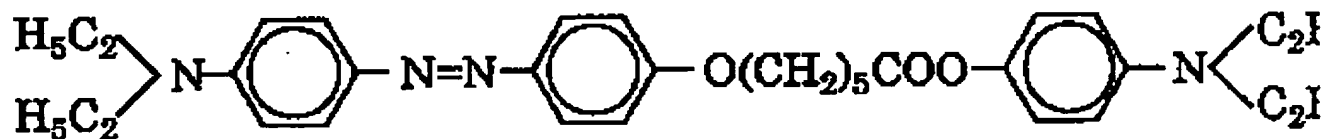
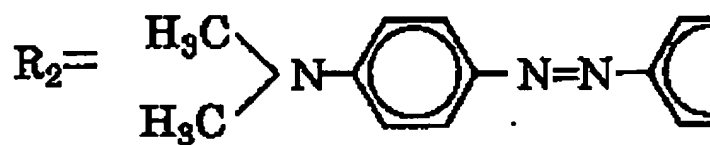
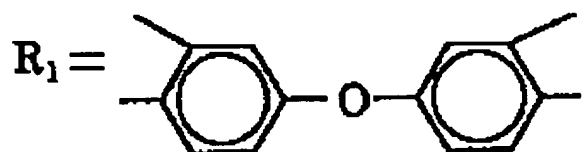
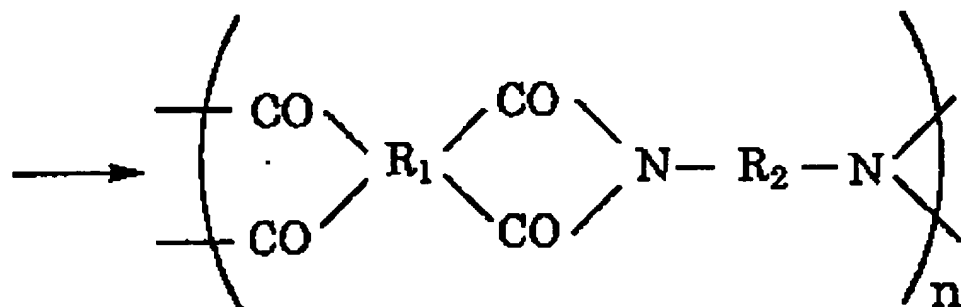
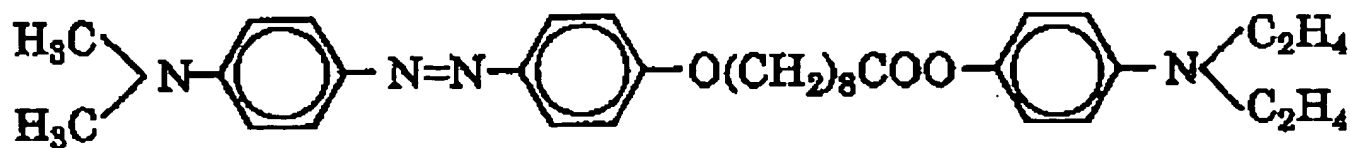
[0110]

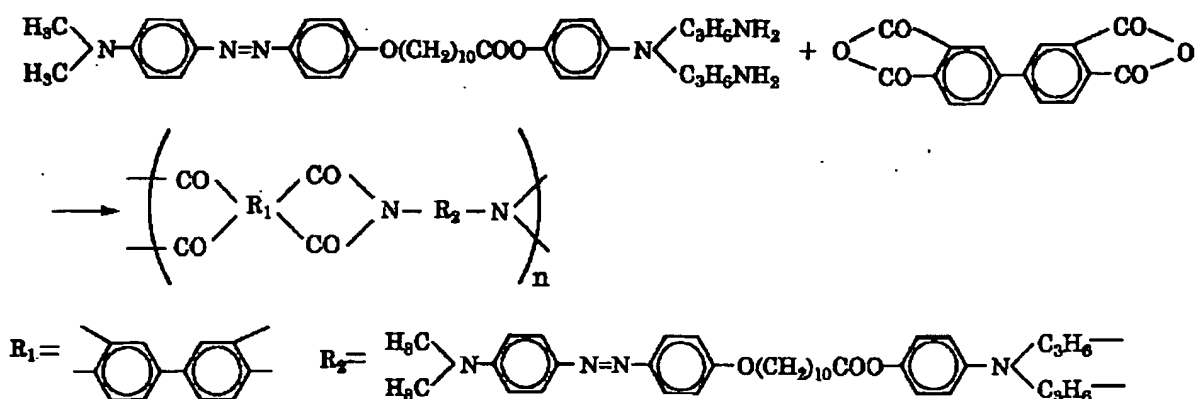


[0111]



[0112]





[0114] It irradiates for 1 minute from the distance of 50cm on the film surface of the glass substrate which formed this polyamide thin film through the mask of the shape of a stripe shown in the polyamide thin film spreading substrate produced in example 9 example 1 at drawing 3 in the linearly polarized light acquired like an example 1, and the molecule shaft of the optical active group of a polarization exposure part is made to arrange in the fixed direction. Subsequently, the linearly polarized light rotated 90 degrees is irradiated for 1 minute from the distance of 50cm through the mask of the shape of a stripe shown in drawing 4 on the film surface of the unexposed section of this polyamide thin film spreading substrate, and the molecule shaft of the optical active group of a polarization exposure part is made to arrange in the direction different 90 degrees from said molecule shaft.

[0115] The heating dissolution of the 0.5 sections and the emulgen 108 (nonionic surface active agent: Kao Corp. make) 0.2 section is carried out [production C.I.Direct Blue 1 of the meeting nature dichroism coloring matter film / the one section and C.I.Direct Blue 67 / the one section and C.I.Direct Red 79] for the 0.5 sections and C.I.Direct Orange 39 at the deionized water 96.8 section, and a coloring matter solution is prepared. This coloring matter solution was used on the film surface of the above-mentioned polyamide thin film substrate, and the roll coater was applied. The roll coater tuned the location between a coating roll and a substrate finely beforehand, was pushed between the roll and the substrate, and adjusted ** to 0.2MPa(s). Measurement of a pressure was measured by the Fuji film press kale. The applied substrate obtained the polarizing element of the shape of a stripe from which it dried under the condition of 30 degrees C and 60%RH, and 90 degrees of polarization shafts of this invention differed.

[0116] It irradiates for 1 minute from the distance of 50cm on the film surface of the glass substrate which formed this polyamide thin film through the mask of the shape of a stripe shown in the polyamide thin film spreading substrate produced in example 10 example 4 at drawing 3 in the linearly polarized light acquired like an example 4, and the molecule shaft of the optical active group of a polarization exposure part is made to arrange in the fixed direction. Subsequently, the linearly polarized light rotated 90 degrees is irradiated for 1 minute from the distance of 50cm through the mask of the shape of a stripe shown in drawing 4 on the film surface of the unexposed section of this polyamide thin film spreading substrate, and the molecule shaft of the optical active group of a polarization exposure part is made to arrange in the direction different 90 degrees from said molecule shaft.

[0117] The heating dissolution of the 0.5 sections and the emulgen 108 (nonionic surface active agent: Kao Corp. make) 0.2 section is carried out [production C.I.Direct Blue 83 of the meeting nature dichroism coloring matter film / the one section and C.I.Direct Blue 67 / the one section and C.I.Direct Red 2] for the 0.5 sections and C.I.Direct Orange 39 at the deionized water 96.8 section, and a coloring matter solution is prepared. This coloring matter solution was used on the film surface of the above-mentioned polyamide thin film substrate, and the roll coater was applied. The roll coater tuned the location between a coating roll and a substrate finely beforehand, was pushed between the roll and the substrate, and adjusted ** to 0.2MPa(s). Measurement of a pressure was measured by the Fuji film press kale. The applied substrate obtained the polarizing element of the shape of a stripe from which it dried under the condition of 30 degrees C and 60%RH, and 90 degrees of polarization shafts of this invention differed.

[0118] The linearly polarized light acquired like an example 1 by the polyamide thin film spreading substrate produced in example 11 example 1 is irradiated for 1 minute from the distance of 50cm on the film surface of the glass substrate in which this polyamide thin film was formed, and the molecule shaft of the optical active group of a polarization exposure part is made to arrange in the fixed direction.

[0119] Production of the meeting nature dichroism coloring matter film.

C. Carry out the heating dissolution of the three sections and the emulgen 108 (nonionic surface active agent: Kao Corp. make) 0.02 section for I.Direct Blue 15 at the deionized water 6.98 section, and prepare a blue coloring matter solution. Next, the heating dissolution of the three sections and the emulgen 108 (nonionic surface active agent: Kao Corp. make) 0.02 section is carried out for C.I.Direct Red 28 at the deionized water 6.98 section, and a red-dyes solution is prepared. Furthermore, the heating dissolution of the three sections and the emulgen 108 (nonionic surface active agent: Kao Corp. make) 0.02 section is carried out for C.I.Direct Green 85 at the deionized water 6.98 section, and a green coloring matter solution is prepared. this coloring matter solution -- screen printing -- the shape of a stripe -- blue and red -- green -- it prints on the film surface of the above-mentioned polyamide thin film substrate to according to, respectively, it dries under the condition of 40 degrees C and 60%RH, and the polarizing element of the blue of this invention, red, and the shape of a green stripe is obtained.

[0120] Production and a linearly polarized light exposure of an example 12 light active group content polyamide thin film.

The polyamide compound (1) refined-material 2 section obtained in the example 1 is dissolved in the NMP98 section, and a polymer solution is produced 2%. Next, on a glass substrate, a spin coat is carried out so that it may become about 0.6 to 0.7 micrometer desiccation thickness, stoving is carried out at 100 degrees C for 2 hours, and this polyamide thin film is formed. After considering as the light with 500nm cut-off filter using an extra-high pressure mercury lamp (500 W/hr) and considering as the linearly polarized light through a polarizing plate further, it irradiates for 1 minute from the distance of 50cm on the film surface of the glass substrate in which this polyamide thin film was formed, and the molecule shaft of the optical active group of a polarization exposure part is made to arrange in the fixed direction. Subsequently, the linearly polarized light which has a different polarization shaft through a stripe-like mask is irradiated similarly, and the molecule shaft of an optical active group is made to arrange in the different direction partially.

[0121] The heating dissolution of the production C.I.Direct Blue 67 5 section of the meeting nature dichroism coloring matter film and the EMARU E-27C(polyoxyethylene lauryl ethereal-sulfate sodium: anionic surface active agent : Kao Corp. make) 0.2 section is carried out at the deionized water 94.8 section, and a coloring matter solution is prepared. This coloring matter solution was used on the film surface of the above-mentioned polyamide thin film substrate, and the roll coater for sheet substrates was applied. The roll coater tuned the location between a coating roll and a substrate finely beforehand, was pushed between the roll and the substrate, and adjusted ** to 0.3MPa(s). Measurement of a pressure was measured by the Fuji film press kale. It dried under the condition of 30 degrees C and 60%RH, and the applied substrate obtained the polarizing element of the shape of a stripe of this invention. The dichroism ratio in absorption-maximum wavelength was 25.

[0122] The polyamide compound (2) refined-material 2 section obtained in production of an example 13 light active group content polyamide thin film and the linearly polarized light exposure example 2 is dissolved in the NMP98 section, and a polymer solution is produced 2%. The linearly polarized light is irradiated for 1 minute from the distance of 50cm on the film surface of the glass substrate which formed this polyamide thin film according to the example 12, and formed this polyamide thin film, and the molecule shaft of the optical active group of a polarization exposure part is made to arrange in the fixed direction. Subsequently, the linearly polarized light which has a different polarization shaft through a stripe-like mask is irradiated similarly, and the molecule shaft of an optical active group is made to arrange in the different direction partially.

[0123] The heating dissolution of the production 1C.I.Direct Blue 67 5 section of the meeting nature dichroism coloring matter film and the EMARU E-27C(anionic surface active agent: Kao Corp. make) 0.2 section is carried out at the deionized water 94.8 section, and a coloring matter solution is prepared. This coloring matter solution was used on the film surface of the above-mentioned polyamide thin film substrate, and the roll coater for sheet substrates was applied. The roll coater tuned the location between a coating roll and a substrate finely beforehand, was pushed between the roll and the substrate, and adjusted ** to 0.2MPa(s). Measurement of a pressure was measured by the Fuji film press kale. It dried under the condition of 30 degrees C and 60%RH, and the applied substrate obtained the polarizing element of the shape of a stripe of this invention.

[0124] The heating dissolution of the one section and the EMARU E-27C(anionic surface active agent: Kao Corp. make) 0.2 section is carried out for production 2Benzopurpurine 4B of the meeting nature dichroism coloring matter film at the deionized water 98.8 section, and a coloring matter solution is prepared. This coloring matter solution was used on the film surface of the above-mentioned polyamide thin film substrate, and the roll coater for sheet substrates was applied. The roll coater tuned the location between a coating roll and a substrate finely beforehand, was pushed between the roll and the substrate, and adjusted ** to 0.2MPa(s). Measurement of a pressure was measured by the Fuji film press kale. It dried under the condition of 30 degrees C and 60%RH, and the applied substrate obtained the polarizing element of the shape of a stripe of this invention. The dichroism ratio in absorption-maximum wavelength was 30.

[0125] The polyamide compound (2) refined-material 2 section obtained in production of an example 14 light active group content polyamide thin film and the linearly polarized

light exposure example 2 is dissolved in the NMP98 section, and a polymer solution is produced 2%. The linearly polarized light is irradiated for 1 minute from the distance of 50cm on the film surface of the glass substrate which formed this polyamide thin film according to the example 12, and formed this polyamide thin film, and the molecule shaft of the optical active group of a polarization exposure part is made to arrange in the fixed direction. Subsequently, the linearly polarized light which has a different polarization shaft through a stripe-like mask is irradiated similarly, and the molecule shaft of an optical active group is made to arrange in the different direction partially.

[0126] The heating dissolution of the production C.I.Direct Blue 67 10 section of the meeting nature dichroism coloring matter film and the EMARU 20CM(polyoxyethylene-alkyl-ether sodium sulfate: anionic surface active agent : Kao Corp. make) 0.2 section is carried out at the deionized water 89.8 section, and a coloring matter solution is prepared. This coloring matter solution was used on the film surface of the above-mentioned polyamide thin film substrate, and the roll coater for sheet substrates was applied. The roll coater tuned the location between a coating roll and a substrate finely beforehand, was pushed between the roll and the substrate, and adjusted ** to 0.5MPa(s). Measurement of a pressure was measured by the Fuji film press kale. It dried under the condition of 30 degrees C and 60%RH, and the applied substrate obtained the polarizing element of the shape of a stripe of this invention.

[0127] The polyamide compound (2) was compounded like the synthetic aforementioned example 4 of an example 15 polyamide compound (2). It was clear from NMR measurement that this thing's about 90% of oxy-radical is permuted by 4-(4'-dimethylamino) phenylazo phenoxy undeca noil radical.

[0128] The polyamide compound refined material 2 section obtained with production of an optical active group content polyamide thin film and the linearly polarized light exposure above is dissolved in the NMP98 section, and a polymer solution is produced 2%. The linearly polarized light is irradiated for 1 minute from the distance of 50cm on the film surface of the glass substrate which formed this polyamide thin film according to the example 12, and formed this polyamide thin film, and the molecule shaft of the optical active group of a polarization exposure part is made to arrange in the fixed direction. Subsequently, the linearly polarized light which has a different polarization shaft through a stripe-like mask is irradiated similarly, and the molecule shaft of an optical active group is made to arrange in the different direction partially.

[0129] The heating dissolution of the three sections and the EMARU 20T (polyoxyethylene-alkyl-ether sulfuric-acid triethanolamine: anionic surface active agent : Kao Corp. make)0.2 section is carried out for production C.I.Direct Blue 67 of the meeting nature dichroism coloring matter film at the deionized water 96.8 section, and a coloring matter solution is adjusted. This coloring matter solution was used on the film surface of the above-mentioned polyamide thin film substrate, and the roll coater was applied. The roll coater tuned the location between a coating roll and a substrate finely beforehand, was pushed between the roll and the substrate, and adjusted ** to 0.2MPa(s). Measurement of a pressure was measured by the Fuji film press kale. It dried under the condition of 30 degrees C and 60%RH, and the applied substrate obtained the polarizing element of the shape of a stripe of this invention. By the same approach as an example 15, the polarizing element of the shape of SUTORAIBU of this invention can be obtained also about the polyamide compound of the above mentioned table 1.

[0130] The polyamide compound (3) refined-material 2 section obtained in production of an example 16 light active group content polyamide thin film and the linearly polarized light exposure example 5 is dissolved in the NMP98 section, and a polymer solution is produced 2%. Next, on a glass substrate, a spin coat is carried out so that it may become about 0.6 to 0.7 micrometer desiccation thickness, stoving is carried out for 10 minutes at 180 degrees C, and this polyamide thin film is formed. After considering as the light with 550nm cut-off filter using an extra-high pressure mercury lamp (500 W/hr) and considering as the linearly polarized light through a polarizing plate further, it irradiates for 1 minute from the distance of 50cm on the film surface of the glass substrate in which this polyamide thin film was formed, and the molecule shaft of the optical active group of a polarization exposure part is made to arrange in the fixed direction. Subsequently, the linearly polarized light which has a different polarization shaft through a stripe-like mask is irradiated similarly, and the molecule shaft of an optical active group is made to arrange in the different direction partially.

[0131] The heating dissolution of the production C.I.Direct Blue 67 3 section of the meeting nature dichroism coloring matter film and the EMARU NC-35 (polyoxyethylene-alkyl-phenyl-ether sodium sulfate: anionic surface active agent : Kao Corp. make) 0.2 section is carried out at the deionized water 96.8 section, and a coloring matter solution is prepared. This coloring matter solution was used on the film surface of the above-mentioned polyamide thin film substrate, and the roll coater was applied. The roll coater tuned the location between a coating roll and a substrate finely beforehand, was pushed between the roll and the substrate, and adjusted ** to 0.2MPa(s). Measurement of a pressure was measured by the Fuji film press kale. It dried under the condition of 30 degrees C and 60%RH, and the applied substrate obtained the polarizing element of the shape of a stripe of this invention.

[0132] The polyamide compound (4) refined-material 2 section obtained in production of an example 17 light active group content polyamide thin film and the linearly polarized light exposure example 6 is dissolved in the NMP98 section, and a polymer solution is produced 2%. After forming this polyamide thin film according to an example 12, considering as the light with 500nm cut-off filter using an extra-high pressure mercury lamp (500 W/hr) and considering as the linearly polarized light through a polarizing plate further, it irradiates for 1 minute from the distance of 50cm on the film surface of the glass substrate in which this polyamide thin film was formed, and the molecule shaft of the optical active group of a polarization exposure part is made to arrange in the fixed direction. Subsequently, the linearly polarized light which has a different polarization shaft through a stripe-like mask is irradiated similarly, and the molecule shaft of an optical active group is made to arrange in the different direction partially.

[0133] The heating dissolution of the one section and the REBENORU WX(polyoxyethylene-alkyl-ether sodium sulfate: anionic surface active agent : Kao Corp. make)0.2 section is carried out for production Benzopurpurine 4B of the meeting nature dichroism coloring matter film at the deionized water 98.8 section, and a coloring matter solution is prepared. This coloring matter solution was used on the film surface of the above-mentioned polyamide thin film substrate, and the roll coater for sheet substrates was applied. The roll coater tuned the location between a coating roll and a substrate finely beforehand, was pushed between the roll and the substrate, and adjusted ** to 0.2MPa(s). Measurement of a pressure was measured by the Fuji film press kale. It

dried under the condition of 30 degrees C and 60%RH, and the applied substrate obtained the polarizing element of the shape of a stripe of this invention.

[0134] Like composition of example 18 polyimide (1), and the preparation example 7 of a thin film, composition of polyimide (1) and preparation of a thin film were performed, and the polyimide thin film substrate was obtained.

[0135] The heating dissolution of the production C.I.Direct Blue 67 1 section of the meeting nature dichroism coloring matter film and the 25R(lauryl ammonium sulfate: anionic surface active agent : Kao Corp. make) EMARU AD-0.02 section is carried out at the deionized water 8.98 section, and a coloring matter solution is prepared. This coloring matter solution was used on the film surface of the above-mentioned polyimide thin film substrate, and the roll coater was applied. The roll coater tuned the location between a coating roll and a substrate finely beforehand, was pushed between the roll and the substrate, and adjusted ** to 0.2MPa(s). Measurement of a pressure was measured by the Fuji film press kale. It dried under the condition of 30 degrees C and 60%RH, and the applied substrate obtained the polarizing element of the shape of a stripe of this invention.

[0136] Like composition of example 19 polyimide (2), and the preparation example 8 of a thin film, composition of polyimide (2) and preparation of a thin film were performed, and the polyimide thin film substrate was obtained.

[0137] The heating dissolution of the production C.I.Direct Blue 67 1 section of the meeting nature dichroism coloring matter film and the EMARU E-27C(polyoxyethylene lauryl ethereal-sulfate sodium: anionic surface active agent : Kao Corp. make) 0.02 section is carried out at the deionized water 8.98 section, and a coloring matter solution is adjusted. This coloring matter solution was used on the film surface of the above-mentioned polyimide thin film substrate, and the roll coater was applied. The roll coater tuned the location between a coating roll and a substrate finely beforehand, was pushed between the roll and the substrate, and adjusted ** to 0.2MPa(s). Measurement of a pressure was measured by the Fuji film press kale. It dried under the condition of 30 degrees C and 60%RH, and the applied substrate obtained the polarizing element of the shape of a stripe of this invention.

[0138] The polarizing element of the shape of a stripe of this invention can be obtained using the polyimide shown in Table 2 by creating the meeting nature dichroism coloring matter film according to examples 18 and 19.

[0139] It irradiates for 1 minute from the distance of 50cm on the film surface of the glass substrate which formed this polyamide thin film through the mask of the shape of a stripe shown in the polyamide thin film spreading substrate produced in example 20 example 12 at drawing 4 in the linearly polarized light acquired like an example 12, and the molecule shaft of the optical active group of a polarization exposure part is made to arrange in the fixed direction. Subsequently, the linearly polarized light rotated 90 degrees is irradiated for 1 minute from the distance of 50cm through the mask of the shape of a stripe shown in drawing 3 on the film surface of the unexposed section of this polyamide thin film spreading substrate, and the molecule shaft of the optical active group of a polarization exposure part is made to arrange in the direction different 90 degrees from said molecule shaft.

[0140] The heating dissolution of the 0.5 sections and the EMARU 20C(polyoxyethylene lauryl ethereal-sulfate sodium: Kao Corp. make) 0.2 section is carried out [production

C.I.Direct Blue 1 of the meeting nature dichroism coloring matter film / the one section and C.I.Direct Blue 67 / the one section and C.I.Direct Red 79] for the 0.5 sections and C.I.Direct Orange 39 at the deionized water 96.8 section, and a coloring matter solution is prepared. This coloring matter solution was used on the film surface of the above-mentioned polyamide thin film substrate, and the roll coater was applied. The roll coater tuned the location between a coating roll and a substrate finely beforehand, was pushed between the roll and the substrate, and adjusted ** to 0.2MPa(s). Measurement of a pressure was measured by the Fuji film press kale. The applied substrate obtained the polarizing element of the shape of a stripe from which it dried under the condition of 30 degrees C and 60%RH, and 90 degrees of polarization shafts of this invention differed. [0141] It irradiates for 1 minute from the distance of 50cm on the film surface of the glass substrate which formed this polyamide thin film through the mask of the shape of a stripe shown in the polyamide thin film spreading substrate produced in example 21 example 15 at drawing 3 in the linearly polarized light acquired like an example 15, and the molecule shaft of the optical active group of a polarization exposure part is made to arrange in the fixed direction. Subsequently, the linearly polarized light rotated 90 degrees is irradiated for 1 minute from the distance of 50cm through the mask of the shape of a stripe shown in drawing 4 on the film surface of the unexposed section of this polyamide thin film spreading substrate, and the molecule shaft of the optical active group of a polarization exposure part is made to arrange in the direction different 90 degrees from said molecule shaft.

[0142] They are [Direct Blue / 83 / of the meeting nature dichroism coloring matter film / production C.I./ Direct Blue / 67 / the one section and / C.I.] the 0.5 sections and EMARU 20C about the 0.5 sections and C.I.Direct Orange 39 in the one section and C.I.Direct Red 2. The heating dissolution of the 0.2 sections is carried out at the deionized water 96.8 section, and a coloring matter solution is prepared. This coloring matter solution was used on the film surface of the above-mentioned polyamide thin film substrate, and the roll coater was applied. The roll coater tuned the location between a coating roll and a substrate finely beforehand, was pushed between the roll and the substrate, and adjusted ** to 0.2MPa(s). Measurement of a pressure was measured by the Fuji film press kale. The applied substrate obtained the polarizing element of the shape of a stripe from which it dried under the condition of 30 degrees C and 60%RH, and 90 degrees of polarization shafts of this invention differed.

[0143] The linearly polarized light acquired like an example 12 by the polyamide thin film spreading substrate produced in example 22 example 12 is irradiated for 1 minute from the distance of 50cm on the film surface of the glass substrate in which this polyamide thin film was formed, and the molecule shaft of the optical active group of a polarization exposure part is made to arrange in the fixed direction.

[0144] The heating dissolution of the three sections and the EMARU 20C(anionic surface active agent: Kao Corp. make) 0.02 section is carried out for production C.I.Direct Blue 15 of the meeting nature dichroism coloring matter film at the deionized water 6.98 section, and a blue coloring matter solution is prepared. Next, the heating dissolution of the three sections and the EMARU 20C(anionic surface active agent: Kao Corp. make) 0.02 section is carried out for C.I.Direct Red 28 at the deionized water 6.98 section, and a red-dyes solution is prepared. Furthermore, the heating dissolution of the three sections and the EMARU 20C(anionic surface active agent: Kao Corp. make) 0.02 section is

carried out for C.I.Direct Green 85 at the deionized water 6.98 section, and a green coloring matter solution is prepared. this coloring matter solution -- screen printing -- the shape of a stripe -- blue and red -- green -- it prints on the film surface of the above-mentioned polyamide thin film substrate to according to, respectively, it dries under the condition of 40 degrees C and 60%RH, and the polarizing element of the blue of this invention, red, and the shape of a green stripe is obtained.

[0145]

[Effect of the Invention] According to this invention, a polarizing element is obtained only by making the liquid crystallinity resin thin film layer which has the optical active group which irradiated the linearly polarized light arrange a dichroism molecule in the shape of a micro pattern. Since extension actuation was unnecessary, it became possible to make a direct polarizing element also on the substrate in which extension like a glass substrate is impossible. Moreover, it is possible to change the array of a dichroism molecule only by changing the polarization shaft of the linearly polarized light to irradiate, therefore manufacture of the micro pattern polarizing element from which a polarization shaft differs on a substrate was attained. The solid image display of the liquid crystal display component which used this substrate becomes possible easily.

[0146]

